Draft Programmatic Environmental Impact Statement

Improvements to the USIBWC Rio Grande Flood Control Projects along the Texas-Mexico Border

Lead Agency:

United States Section
International Boundary
and Water Commission
El Paso, Texas

Cooperating Agencies:

U.S. Army Corps of Engineers
Galveston District, Texas

U.S. Bureau of Reclamation
El Paso Field Division, Texas

U.S. Fish and Wildlife Service
Corpus Christi, Texas
Ecological Services Field Office

Technical Support:
PARSONS
Austin, Texas

July 2007

Cover Sheet

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

IMPROVEMENTS TO THE USIBWC RIO GRANDE FLOOD CONTROL PROJECTS ALONG THE TEXAS-MEXICO BORDER

(X) Draft ( ) Final

Lead Agency

United States Section, International Boundary and Water Commission (USIBWC)
El Paso, Texas

Cooperating Agencies

United States Bureau of Reclamation
United States Fish and Wildlife Service
U.S. Army Corps of Engineers

Abstract

The USIBWC anticipates the need to improve capabilities or functionality of three Rio Grande flood control projects (FCP) located in the Texas-Mexico border: Rectification FCP, Presidio FCP, and Lower Rio Grande FCP.

Improvement measures associated with the project core mission of flood protection, boundary stabilization, and water delivery are evaluated under the Enhanced Operation and Maintenance (EOM) Alternative. Additional measures intended to improve water use, quality, and conservation are considered under the Integrated Water Resources Management (IWR) Alternative; and measures in support of local or regional initiatives for increased utilization of the project or to improve environmental conditions are evaluated under the Multipurpose Project Management (MPM) Alternative.

This Programmatic Environmental Impact Statement (PEIS) evaluates potential environmental consequences of alternatives under consideration for improvement of the three flood control projects. The USIBWC will apply the programmatic evaluation as an overall guidance for the anticipated implementation of future environmental evaluations of individual improvement projects, implementation of which could be possible within a 20-year timeframe.

Other Requirements Served

This PEIS is intended to serve other environmental review and consultation requirements pursuant to 40 CFR 1502.25(a).

Comments Submittal

The Draft PEIS will be available for a 45-day public review period. Comments should be directed by September 24, 2007 to:

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El Paso, Texas 79902

Date of Draft availability to USEPA and the Public:
August 10, 2007.

DRAFT
PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

IMPROVEMENTS TO USIBWC RIO GRANDE FLOOD CONTROL PROJECTS ALONG THE TEXAS-MEXICO BORDER

PREAMBLE

This is a Programmatic Environmental Impact Statement (PEIS) for future improvement alternatives of three flood control projects operated and maintained by the United States Section, International Boundary and Water Commission (USIBWC) along the Texas-Mexico border: the Rio Grande Rectification Project, the Presidio-Ojinaga Flood Control Project, and the Lower Rio Grande Flood Control Project.

The PEIS is organized in four chapters, a Program Background and Alternatives Chapter, and individual chapters for each flood control project.

Chapter I, Program Background and Alternatives, presents background information on the PEIS objective and scope of the environmental review; describes the alternatives and the basis for their development; and documents the environmental compliance and coordination process. Chapter I is composed of three sections, as follows:

> Section 1, Purpose of and Need for Action, indicates the PEIS objective, scope of the environmental review, and a brief description of the flood control projects.
>
> Section 2, Alternatives Formulation, describes the development of the alternatives based on opportunities and constraints, identifies potential project improvement measures, and defines alternatives based on project objectives.
>
> Section 3, Environmental Compliance and Coordination, documents the consultation process followed to develop the alternatives and evaluate potential environmental consequences.

Chapters II, III and IV provide an assessment of environmental consequences of implementing anticipated or possible measures for improvement of each of the flood control projects. Each chapter contains the following three sections:

> Section 1, Description of Alternatives, identifies measures associated with four alternatives for improvement of the flood control projects selected or the PEIS evaluation: a No Action Alternative, the continued implementation of current operation and maintenance (O&M) practices, and three action alternatives: Enhanced Operation

and Maintenance (EOM) Alternative, Integrated Water Resources Management (IWR) Alternative; and Multipurpose Project Management (MPM) Alternative.

Section 2, Affected Environment, provides the basis for evaluation of potential impacts in the areas of water, biological, land use, cultural and socioeconomic resources, as well as environmental health issues (air quality, noise and environmental hazards).

Section 3, Environmental Consequences, is an analysis of potential effects associated with implementation of each alternative. This analysis is presented by resource area, following the sequence used in describing the affected environment.

Support documentation is provided in Appendices, as follows:

A. References

B. County Listings of Threatened and Endangered Species

EXECUTIVE SUMMARY

Purpose of and Need for Action

The USIBWC is proposing a range of alternatives for maintenance activities and future improvements to three of its flood control projects located along the Rio Grande in Texas. Those flood control projects, the locations of which are identified in Figure ES-1, are:

- Rio Grande Rectification Project (***Rectification FCP)*** extending 84.4 river miles along the Rio Grande, downstream from American Diversion Dam to Fort Quitman, Texas.
- Presidio-Ojinaga Flood Control Project (***Presidio FCP***) extending over 13.1 river miles of the Rio Grande near Presidio, Texas.
- Lower Rio Grande Flood Control Project (***Lower Rio Grande FCP)*** extending 186 river miles on the Rio Grande, from Peñitas, Texas to the Gulf of Mexico, and including 120 miles of interior floodway.

The *Programmatic Environmental Impact Statement (PEIS)* is being prepared to evaluate maintenance improvement alternatives that would allow USIBWC to minimize potential environmental impacts and take advantage of environmental and recreational opportunities while meeting its mandate for flood protection, boundary stabilization, and water delivery.

Over a 20-year planning period, the USIBWC anticipates the need to improve capabilities or functionality of the flood control projects. While some improvements to the flood control projects are already in a planning stage or have been developed at a conceptual level, others represent measures considered feasible but not currently envisioned for implementation. Known or anticipated improvements are typically associated with the core mission of flood control, boundary stabilization, and water delivery. Other improvements are associated with additional goals adopted by the USIBWC in support of the projects' core mission. Those goals include improvements in water use, quality, or conservation, and multipurpose utilization of the projects in support of local or regional initiatives for recreational use or environmental improvement.

The USIBWC will apply the programmatic evaluation of potential impacts as an overall guidance for future environmental evaluations of individual improvement projects whose implementation is anticipated or possible within a 20-year timeframe. Once any given improvement project is identified for future implementation, site-specific environmental documentation will be developed based on project specifications and PEIS findings.

Alternatives Considered in Detail

A summary of potential measures under consideration is presented in Table ES-1. For the PEIS evaluation, measures identified as feasible were organized into three action alternatives that reflect the following project goals:

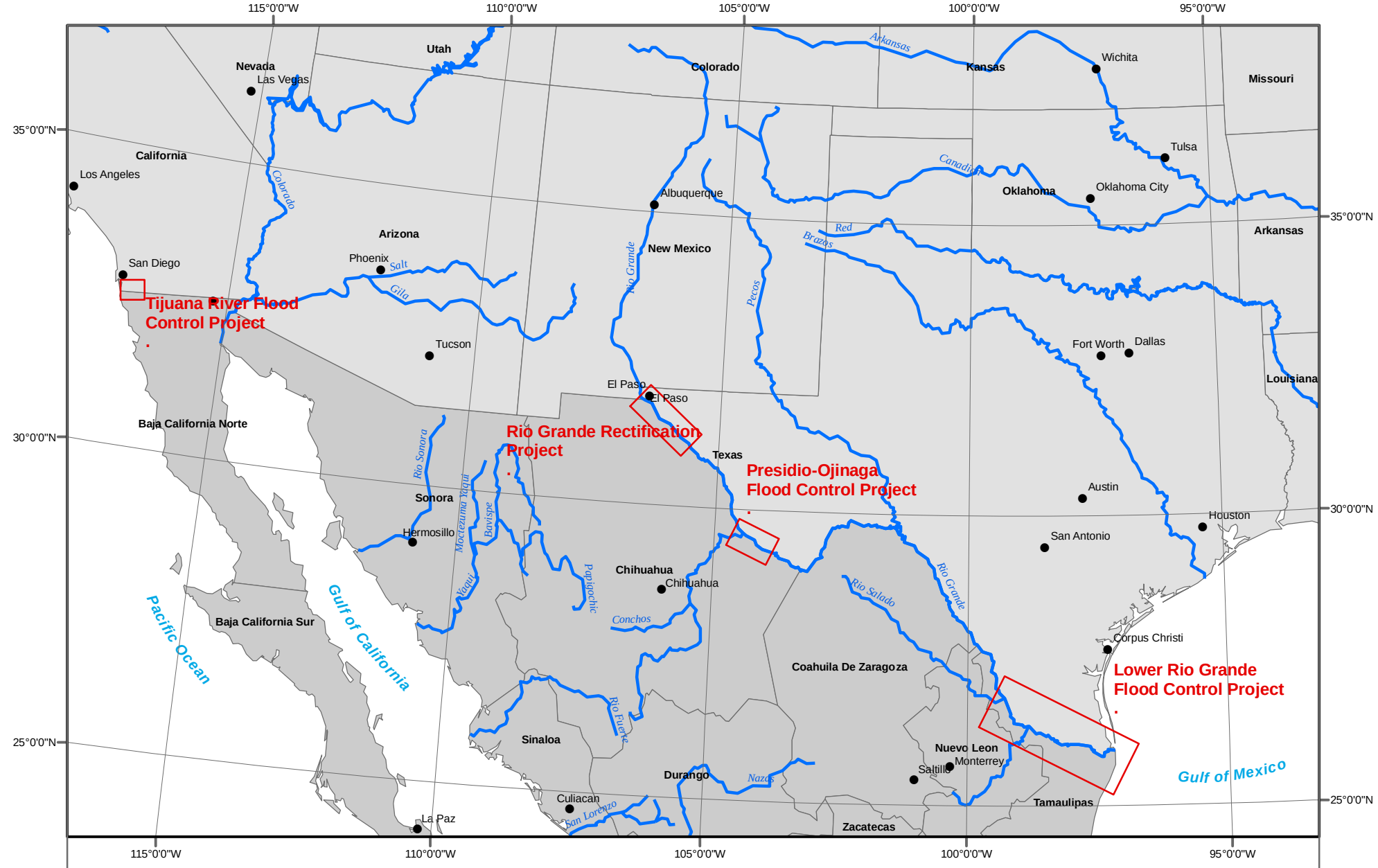

Fig. ES-1
Location of USIBWC Projects

Programmatic EIS
International Boundary and Water Commission,
United States Section

Table ES-1 Potential Changes Relative to Current O&M Practices

	FLOOD CONTROL PROJECT		
	Rectification	**Presidio**	**LRGFCP**
FLOOD CONTROL SYSTEM ALONG THE RIO GRANDE			
Levee Improvements			
Levee height increase	X	X	X
Structural levee improvements	X	X	X
Partial relocation within ROW or new flood easements	X		
Changes in Floodway Management			
Streambank stabilization with vegetation combined with mechanical means			
Changes in vegetation removal and timing/extent of mowing	X		
Agricultural/grazing use			
Restricted Use Zones			X
Changes in Channel Maintenance			
Sediment removal and disposal	X	X	X
Debris removal			
Shore/aquatic vegetation removal			X
New/changes to diversion structures			
INTEGRATED WATER RESOURCES MANAGEMENT			
Water Use and Conservation			
Salt cedar management	X	X	
Revegetation with low-water use species			
Irrigation BMPs to increase water delivery efficiency			X
Wetlands improvement			
Support maintenance of irrigation structures and drains			X
Water Quality			
Water quality monitoring			
Modified irrigation drain maintenance	X		X
Limited floodway revegetation to reduce erosion and sediment load			
MULTIPURPOSE PROJECT MANAGEMENT			
Jurisdictional Floodway Use			
Non-USIBWC floodway maintenance			
Parks, nature trails, recreational areas	X		X
Control of invasive/exotic species	X	X	
Wildlife habitat conservation			
Establish/improve riparian corridors			
Cooperative Agreements and Regional Initiatives			
Vegetation removal and timing/extent of mowing			X
Control of invasive/exotic species outside ROW	X		X
Wildlife habitat conservation inside or outside ROW	X	X	X
Increase backwaters at mouth of arroyos to increase aquatic habitat			
Reconnection of historic, low-elevation meanders for aquatic habitat			
Levee setbacks at flood prone areas for increased habitat			
Flow regime modification to provide year-round baseflow	X		
Watershed management for sediment control			
Upstream sediment control (dams, traps)	X		X

1. Measures associated with projects' mission of flood control, boundary stabilization and water delivery, evaluated under the Enhanced Operation and Maintenance (EOM) Alternative;

2. Measures intended to improve water use, quality, and conservation, considered under the Integrated Water Resources Management (IWR) Alternative; and

3. Measures in support of local or regional initiatives for increased utilization of the project or to improve environmental conditions, evaluated under the Multipurpose Project Management (MPM) Alternative.

Summary of Environmental Consequences

The PEIS compares potential environmental consequences of the EOM, IWR, and MPM alternatives with those expected from continued use of current management and operational practices evaluated under the No Action Alternative. Impacts were evaluated for the following resource areas: water, biological resources, cultural and socioeconomic resources; land use; and environmental health. A summary comparison of potential environmental consequences of the alternatives by resource area, with general application to the three flood control projects under evaluation, is presented in Table ES-2.

Table ES-2 Summary of Environmental Consequences of Alternatives for Improvement of the Rectification FCP

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Water Resources	Current containment may be insufficient to fully control severe floods.	Levee system would increase flood containment capacity to control severe floods.	Flood containment capacity would improve, as well as water resource utilization.	Flood containment capacity would improve; a moderate increase in water use by floodway vegetation would be offset by improved use of water resource.
Biological Resources	The on-going mowing of the levee slopes and floodway would maintain this habitat as relatively low quality for wildlife use. There would be no changes relative to current conditions in terms of potential impacts to wildlife habitat, aquatic ecosystems, wetlands, or unique or sensitive areas.	Little or no changes are expected from the EOM Alternative in terms of vegetation, wildlife habitat, aquatic ecosystems, wetlands, or unique or sensitive areas. Non-native grasses removed by levee improvements would re-establish after construction. The relatively low-quality floodway habitats would be maintained. Potential effects on wetlands would be minimized.	Salt cedar management and revegetation would increase habitat for native plant species and wildlife, including threatened and endangered species. Impacts to wetlands, aquatic ecosystems, and other biological resources would be similar to those of the No Action and EOM Alternatives.	Regional habitat revegetation and conservation initiatives outside the levee corridor would provide additional habitat for native plant species and wildlife, including threatened and endangered species; Improved sediment management and habitat development would improve aquatic ecosystems.
Land Use	Existing residential communities, agricultural lands, and recreational uses would be maintained.	Effects, as in the No Action Alternative. Floodway management changes, including increased U.S. Border Patrol operations, would limit some recreational uses.	Similar to those of the No Action and EOM Alternatives.	Beneficial effects would be expected from multi-jurisdictional, cooperative agreements to promote recreational opportunities, including trail systems.
Cultural Resources	No additional impacts on historical and archaeological resources.	Historical structures and/or archaeological resources could be affected by changes to the levee system configuration.	Similar to those of the EOM Alternative. Impacts would depend on the extent of the proposed projects.	Similar to those of the EOM Alternative.

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Socioeconomic Resources	No change relative to current operations on impacts to regional economics, environmental justice, and transportation.	Temporary input of project funds would not significantly improve regional economics. Adverse effects to minority and low-income populations are not expected. Increased use of main roadways and access roads would be minor and limited to project duration.	Impacts would be the same as the EOM Alternative. Roadway utilization would depend on the extent of proposed initiatives.	Impacts would be the same as the EOM Alternative.
Environmental Health				
Environmental Health	Emissions generating activities and noise generation would be the same as the current ongoing activities. There would be no impacts to public health and environmental hazards.	Regional air quality would not be impacted. Small increases in emissions and noise generation would be temporary during construction activities. There would be no impacts to public health and environmental hazards.	Impacts would be the same as the EOM Alternative. Roadway utilization would depend on the extent of proposed initiatives.	Impacts would be the same as the EOM Alternative.

DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

IMPROVEMENTS TO USIBWC RIO GRANDE FLOOD CONTROL PROJECTS ALONG THE TEXAS-MEXICO BORDER

CHAPTER I

PROGRAM BACKGROUND AND ALTERNATIVES

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ACRONYMS AND ABBREVIATIONS

Ac-ft	acre feet
ac-ft/yr	acre feet per year
ANSI	American National Standards Institute
AQCR	Air Quality Control Region
ARPA	Archaeological Resource Protection Act
CEQ	Council on Environmental Quality
cfs	cubic feet per second
DNL	day-night average sound level
E.O.	executive order
EOM	enhanced operation and maintenance
FCP	Flood Control Project
FM	farm-to-market
HCCRD	Hudspeth County Conservation and Reclamation District
HPA	high probability area
IH	Interstate
INS	Immigration and Naturalization Service
IWR	Integrated water resources management
JTF-6	Joint Task Force - Six
LRGV	Lower Rio Grande Valley
Mg/L	milligrams per liter
mgd	million gallons per day
MOU	memorandum of understanding
MPM	Multi-purpose project management
MSL	mean sea level
MxIBWC	Mexico Section International Boundary and Water Commission
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
O&M	operation and maintenance
PEIS	Programmatic Environmental Impact Statement
PM_{10}	particulate matter greater than 10 micrometers

Presidio FCP	Presidio-Ojinaga Flood Control Project
RCRA	Resource Conservation and Recovery Act
Rectification FCP	Rio Grande Rectification FCP
ROW	right of way
Santa Ana NWR	Santa Ana National Wildlife Refuge
SIP	state implementation plan
SPCC	spill prevention, control, and countermeasures
T&E	threatened and endangered
TAC	Texas Administrative Code
TARL	Texas Archeological Research Laboratory
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
USACE	U.S. Army Corps of Engineers
USBP	U.S. Border Patrol
USC	U.S. Code
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USIBWC	United States Section International Boundary and Water Commission
WBC	World Birding Center
WMA	Wildlife Management Areas

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SECTION 1
PURPOSE OF AND NEED FOR ACTION

This section describes the background associated with the action, purpose of and need for the action, the scope of the environmental evaluation, and gives a summary description of each project. Figures illustrating location and main features of flood control projects are presented at the end of Section 1 (Figures 1 to 9).

1.1 BACKGROUND

1.1.1 Scope of the Environmental Review

Federal agencies are required to take into consideration the environmental consequences of proposed and alternative actions in the decision-making process under the National Environmental Policy Act (NEPA) of 1969, as amended. The President's Council on Environmental Quality issued regulations to implement NEPA that include provisions for both the content and procedural aspects of the required environmental analysis. In 1978, the Council on Environmental Quality issued regulations implementing the process (40 Code of Federal Regulations 1500-1508).

The United States Section, International Boundary and Water Commission (USIBWC) regulations for implementing NEPA are specified in *Operational Procedures for Implementing Section 102 of the National Environmental Policy Act of 1969, Other Laws Pertaining to Specifics Aspects of the Environment and Applicable Executive Orders* (46 FR 44083, September 2, 1981). These federal regulations establish both the administrative process and substantive scope of the environmental impact evaluation designed to ensure that deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action.

This *Programmatic Environmental Impact Statement (PEIS)* evaluates a range of alternatives for maintenance activities and future improvements to three of the USIBWC flood control projects (FCP) located in Texas, along the Rio Grande. Those flood control projects are:

- Rio Grande Rectification Project extending 84.4 miles along the Rio Grande, downstream from American Diversion Dam to Fort Quitman, Texas. For the pusposes of this PEIS, this project is identified as ***Rectification FCP***.
- Presidio-Ojinaga Flood Control Project extending over 13.1 river miles of the Rio Grande near Presidio, Texas. Throughout the PEIS this project is abbreviated as ***Presidio FCP***.
- Lower Rio Grande Flood Control Project extending 186 river miles on the Rio Grande, from Peñitas, Texas to the Gulf of Mexico, and including 120 miles of interior floodway. Throughout the PEIS this project is abbreviated as ***Lower Rio Grande FCP***.

The PEIS evaluates, at a programmatic level, potential environmental consequences that may result from implementation of a No Action Alternative and three Action Alternatives. The following environmental resources are assessed in the PEIS: water resources, biological resources land use, air quality, noise public health and environmental hazards cultural resources, socioeconomic resources, and cumulative impacts.

The PEIS has been prepared by the USIBWC as the lead agency, in cooperation with the U.S. Army Corps of Engineers (USACE) Galveston District, U.S. Bureau of Reclamation (USBR), El Paso Field Office, and U.S. Fish and Wildlife Service (USFWS), New Mexico Ecological Services Office.

1.1.2 USIBWC Authority

The International Boundary and Water Commission (IBWC), which before 1944 was known as the International Boundary Commission, was created by the Convention of 1889, and consists of a United States Section (the USIBWC) and a Mexican Section (MxIBWC). The IBWC was established to apply the rights and obligations the Governments of the United States and Mexico assumed under the numerous boundary and water treaties and related agreements. Application of the rights and obligations is accomplished in a way that benefits the social and economic welfare of the people on both sides of the boundary and improves relations between the two countries. The mission of the USIBWC has five components, as follows:

- Regulation and conservation of waters of the Rio Grande for use by the United States and Mexico through joint construction, operation, and maintenance of international storage dams and reservoirs and plants for generating hydroelectric energy at the dams, and regulation of the Colorado River waters allocated to Mexico;
- Distribution of waters of the Rio Grande and the Colorado River between the two countries;
- Protection of lands along the Rio Grande from floods through levee and floodway projects and solution of border sanitation and other border water quality problems;
- Preservation of the Rio Grande and Colorado River as the international boundary; and
- Demarcation of the land boundary.

1.2 PURPOSE OF AND NEED FOR ACTION

The USIBWC is proposing a range of alternatives for maintenance activities and future improvements to three of its flood control projects located in Texas, along the Rio Grande: the Rectification FCP, Presdio FCP and Lower Rio Grande FCP. The PEIS is being prepared to evaluate these maintenance improvement alternatives that would allow USIBWC to minimize potential environmental impacts and take advantage of environmental and recreational opportunities while meeting its mandate for flood protection, boundary stabilization, and water delivery.

Over a 20-year planning period, the USIBWC anticipates the need to improve capabilities or functionality the Rectification FCP, Presidio FCP and Lower Rio Grande FCP. While some

improvements to the flood control projects are already in a planning stage or have been developed at a conceptual level, others represent measures considered feasible but not currently envisioned for implementation. Known or anticipated improvements are typically associated with the projects' core mission of flood control, boundary stabilization and water delivery. Other improvements are associated with additional goals adopted by the USIBWC in support of the projects' core mission. Those goals include improvements in water use, quality or conservation, and multipurpose utilization of the projects in support local or regional initiatives for recreational use or environmental improvement.

In compliance with NEPA requirements, the USIBWC routinely prepares environmental evaluations of proposed actions, typically in the form of an Environmental Assessment or, when warranted by significance of potential effects, an Environmental Impact Statement (EIS). Because preparation of those environmental evaluations requires specific definition of the proposed action's characteristics, extent and location, the USIBWC has taken a broad programmatic look at the potential environmental implications of measures to be considered for future implementation. The PEIS documents the affected environment over an entire flood control project area, and assesses potential environmental consequences.

The USIBWC will apply the programmatic evaluation of potential impacts as an overall guidance for future environmental evaluations of individual improvement projects whose implementation is anticipated or possible within a 20-year timeframe. Once any given improvement project is identified for future implementation, site-specific environmental documentation will be developed based on project specifications and PEIS findings.

For the PEIS evaluation, measures identified as feasible were organized in three action alternatives that reflect the following project goals:

1. Measures associated with projects' mission of flood control, boundary stabilization and water delivery, evaluated under the Enhanced Operation and Maintenance (EOM) Alternative;

2. Measures intended to improve water use, quality and conservation, considered under the Integrated Water Resources Management (IWR) Alternative; and

3. Measures in support of local or regional initiatives for increased utilization of the project or to improve environmental conditions, evaluated under the Multipurpose Project Management (MPM) Alternative.

The PEIS compares potential environmental consequences of the EOM, IWR and MPM alternatives with those expected from continued use of current management and operational practices, evaluated under the No Action Alternative.

1.3 INDIVIDUAL PROJECT DESCRIPTION

Figure 1 indicates the location of four flood control projects operated by the USIBWC along the United States-Mexico border, three in in Texas, along the Rio Grande, and a fourth one in southern California, the Tijuana River Flood Control Project. Rio Grande flood control

projects under evaluation in the PEIS are illustrated in Figures 2 to 9, and their main features of the described below.

1.3.1 Rio Grande Rectification Project

The Rio Grande Rectification Project, identified in the PEIS as Rectification FCP, was constructed between 1934 and 1938; it extends 86 river miles from El Paso to Fort Quitman, Texas. The purpose of the project is to stabilize the international river boundary and to provide flood protection for both countries in urban, suburban, and agricultural areas. Figures 2 and 3 show the project location and main geographic features and structures along the upper and lower reaches of the Rectification FCP, respectively.

The Rectification FCP was constructed by straightening the river channel and developing a narrow floodway by constructing levees on both sides of the river. The channel straightening process removed several meanders and resulted in a reduction in the river length from 155 to 86 miles. Four grade control structures were also installed: Island, Tornillo, Alamo, and Guayuco. The average channel depth along the Rectification FCP is 3 to 5 feet. The width of the channel is between 66 and 100 feet and its capacity is 1,000 cfs. The floodway width averages about 590 feet and its capacity is 11,000 cfs. The project includes 85.4 miles of levees on the U.S. side, and 83.7 miles of levees on the Mexico side. The average levee height is 7.2 feet, the average top width is 20 feet.

1.3.2 Presidio-Ojinaga Flood Control Project

The Presidio FCP was implemented in 1975 to protect productive agricultural lands in the Presidio-Ojinaga Valley from frequent flooding. The project was also intended to establish the international boundary as per the Boundary Treaty of 1970. Figures 4 and 5 show the location of the project and key geographic features.

The Presidio FCP provided flood protection by augmenting the capacity of the river channel through the construction of cleared berms and levees on both sides of the river. The project extends for 13.1 miles through Presidio, Texas. Rectification also took place at the time of project construction, reducing the channel length by about 6.3 miles. Levees on the north and south sides of Cibolo Creek are each 145 feet wide, from the landside limit of the right-of-way (ROW) to the creek side ROW limit. The levees were designed to contain a 25-year flood with 4 feet of freeboard. Downstream of the confluence with the Rio Conchos, the design flow is 42,000 cfs. The levees downstream of the end of the river relocation were raised 4 feet following the September 1978 flood.

There are approximately 15 miles of levee length, including the spur levees. The height of the levees varies from 12 to 35 feet, with the higher at the southern end of the project. The crest width was originally designed to be 16 feet, but is currently between 8 and 12 feet, with the narrower crests at the southern end of the project.

1.3.3 Lower Rio Grande Flood Control Project

The Lower Rio Grande FCP extends approximately 186 miles from Peñitas, Texas to the mouth of the river in the Gulf of Mexico. The project was the result of a 1932 agreement between the United States and Mexico to provide flood protection to urban, suburban, and agricultural lands in both countries. Figure 6 shows the overall project location, and individual maps are provided for the upper river reach of the Lower Rio Grande FCP and the Main Floodway (Figure 7), the lower river reach of the Lower Rio Grande FCP (Figure 8), and the North and Arroyo Colorado Floodways (Figure 9).

The Lower Rio Grande FCP consists of the river channel, flood levees in each country, two diversion dams, and off-river floodways in Mexico and the United States. Some river straightening took place between 1976 an 1977 on a 9,000-foot length of river upstream of Hidalgo and Reynosa. The depth of the river channel varies from 1 to 15 feet.

Two diversion dams, Anzalduas and Retamal, were constructed to route most of the flood flows in the off-river floodway systems of the United States and Mexico, respectively. Anzalduas Dam also diverts irrigation flows into Mexico. The interior floodway system in the United States has a total area of 27,013 acres between the levees in Hidalgo, Cameron, and Willacy Counties.

The United States portion of the project includes102 miles of levees along the Rio Grande, and 168 miles in an off-stream, interior floodway system. This off-stream system initiates in the Main Floodway which subsequently separates into the North Floodway and the Arroyo Colorado Floodway at the City of Mercedes. The levee system has an average levee height of approximately 15 feet, an average base width of 90 to 120 feet, and an average crown width of 14 to 16 feet. Levee separation is between 600 feet to 1 mile.

The project was designed and built for a flood of 250,000 cfs at Rio Grande City. During the design flood, 105,000 cfs would be diverted to the United States' off-river floodways at Anzalduas Dam, and 105,000 cfs would be diverted to Mexico's off-river floodway system at Retamal Dam. Diversion of flows at the two dams and water losses between Rio Grande City and the diversions would result in the passage of a maximum of 20,000 cfs through the Brownsville-Matamoros area.

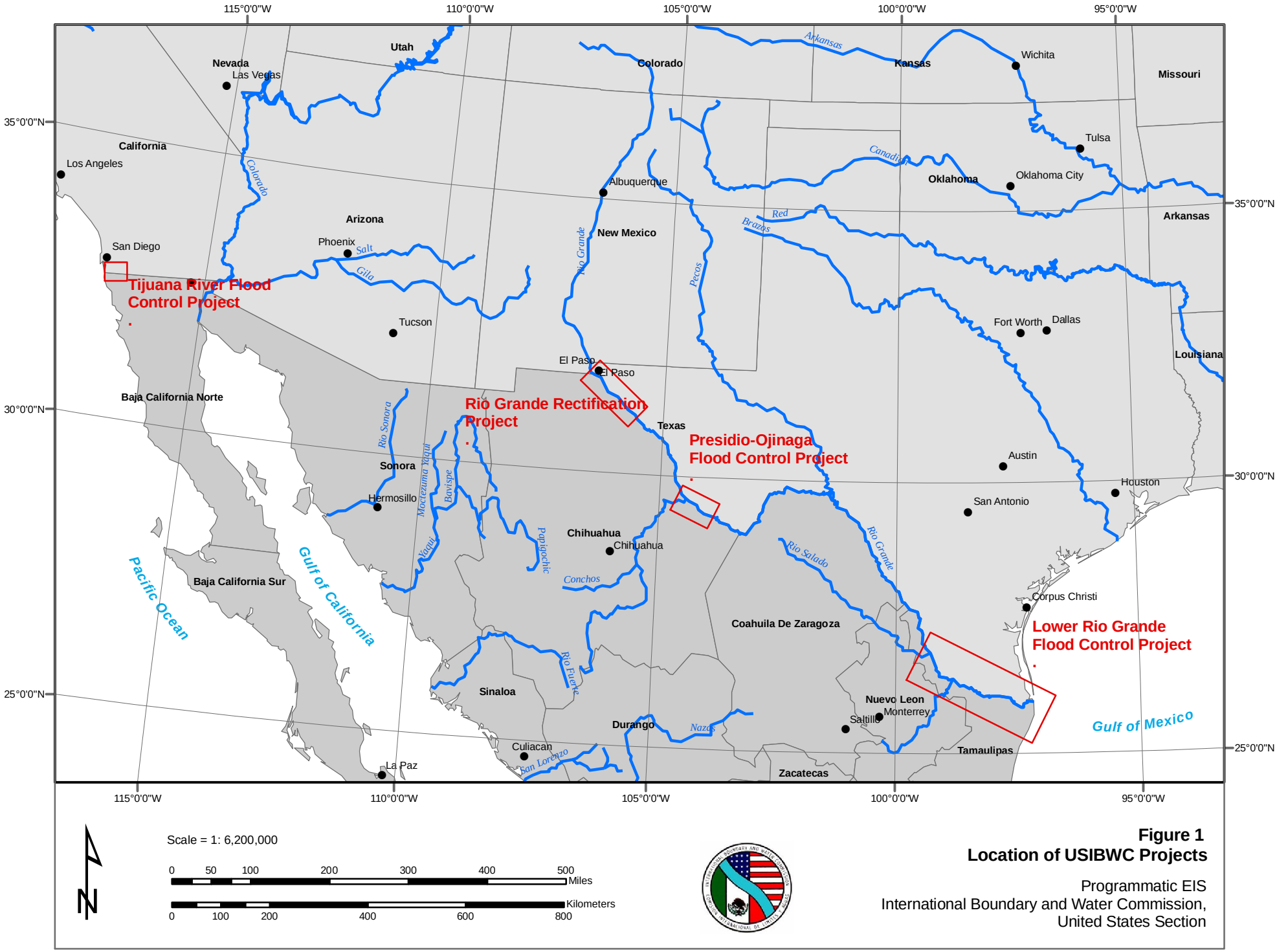


Figure 1
Location of USIBWC Projects

Programmatic EIS
International Boundary and Water Commission,
United States Section

106°0'0"W

31°30'0"N

N

EL PASO

CASTNER RANGE

NORTHGATE

SUNRISE DAM

MOUNTAIN PARK DAM

FORT BLISS

EL PASO INTERNATIONAL AIRPORT

KEYSTONE DAM

McKELLIGON CANYON DAM

OXIDATION POND DAM

AT EL PASO GAGING STATION

COURCHESNE BRIDGE

AMERICAN DAM

INTERNATIONAL DAM

PASO DEL NORTE BRIDGE

GOOD NEIGHBOR BRIDGE

BRIDGE OF THE AMERICAS

McCARATE LAKE

PLAYA DRAIN

ZARAGOZA BRIDGE

RIVERSIDE DAM

CANAL PRINCIPAL

DREN

Socorro

La Coyotera

Colonia Waterfill

Zaragoza

FRANKLIN CANAL

RIVERSIDE CANAL

San Elizario

CLINT

Cuadrilla

FABENS

FABENS DAM

T. P. RR.

Tornillo

TORNILLO CANAL

NEAR CLINT GAGING STATION

RIVER DRAIN

DREN DE INTERCEPTACION

Isla

Loma Blanca

San Isidro

San Agustin

Colonia Jesus Carranza

Tres Jacales

Juarez Reforma

Doctor Porfirio Parra

ISLAND GRADE CONTROL STRUCTURE

GUADALUPE–TORNILLO BRIDGE

TORNILLO GRADE CONTROL STRUCTURE

GUADALUPE BRAVO

RANCHO EL VERGEL

PRAXEDES G. GUERRERO

Ejido Rinconada Mimbre

Frontera

COLONIA ESPERANZA

La Ro

ARROYO DE NAVARRETE

ARR. ZANJON

ARROYO DE LAS BANDEJAS

NEAR ACALA GAGING STATION

Rio Bravo

CHIHUA

Rio Grande

Colonia Lindavista

CIUDAD JUAREZ

JUAREZ AIRPORT

RANCHO FLORES

SIERRA DE JUAREZ

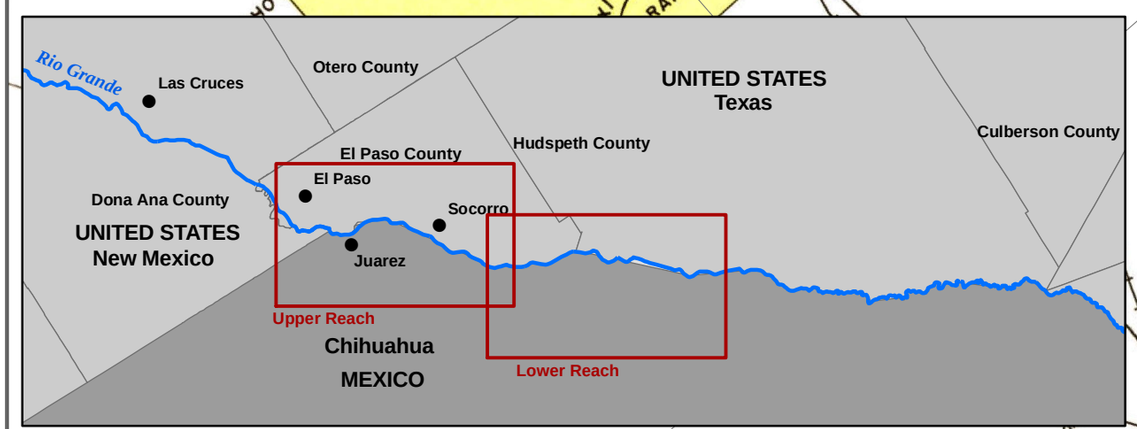
MINA DE SALDAÑA

RUINS

RANCHO SITIO

Oasis

M E X I C O



31°30'0"N

106°30'0"W

Scale = 1: 200,000

0 1 2 4 6 8 Miles

0 1.5 3 6 9 12 Kilometers

LEGEND

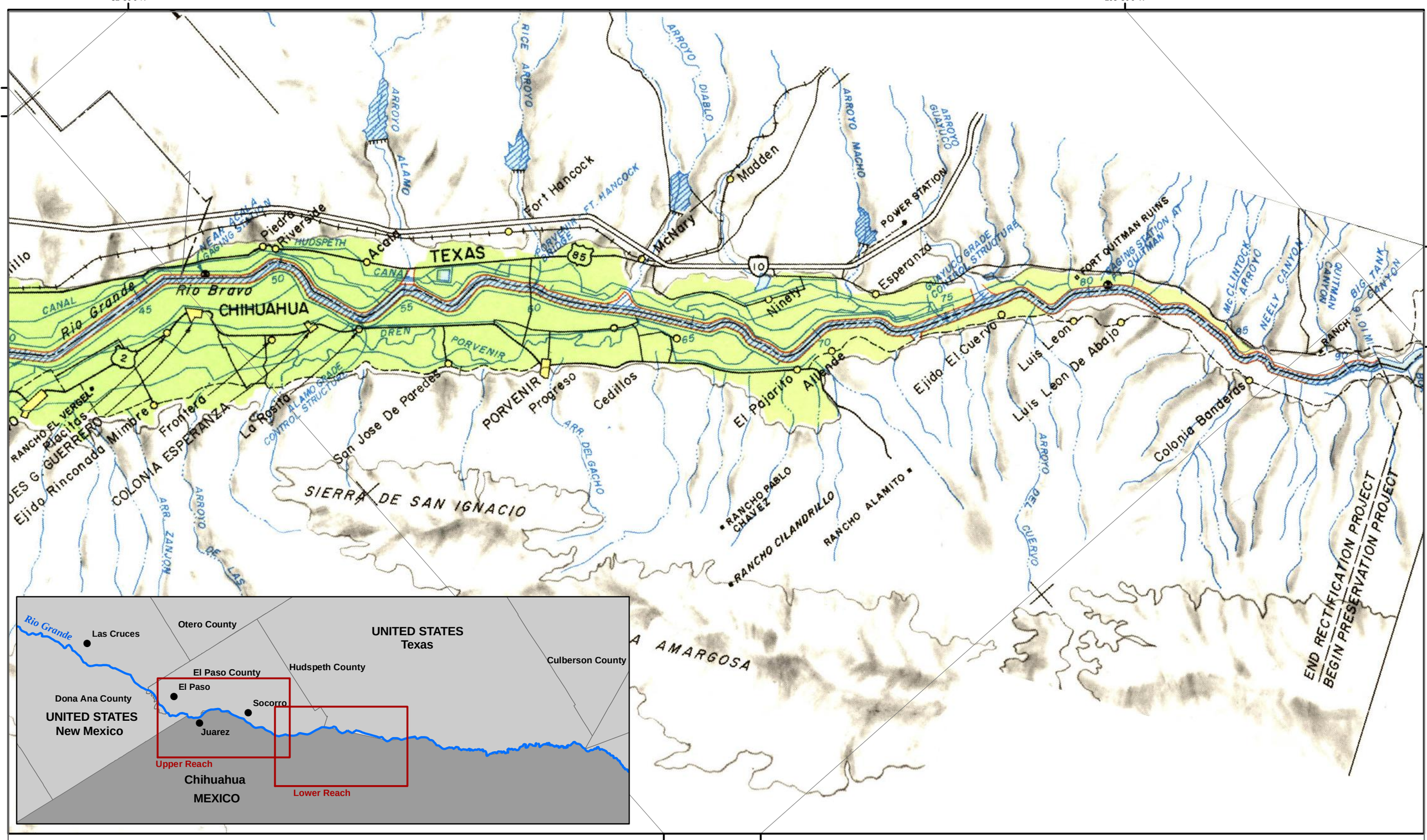
- Irrigated Areas
- Floodway
- Urban Areas
- Military Reservation

Figure 2
Rio Grande Rectification Project - Upper Reach

Programmatic EIS
International Boundary and Water Commission,
United States Section

31°30'0"N

105°30'0"W



106°0'0"W

31°0'0"N

Scale = 1: 200,000

0 1 2 4 6 8 Miles

0 1.5 3 6 9 12 Kilometers

LEGEND

- Irrigated Areas
- Floodway
- Urban Areas
- Military Reservation

Figure 3
Rio Grande Rectification Project - Lower Reach

Programmatic EIS
International Boundary and Water Commission,
United States Section

104°25'0"W

104°20'0"W

29°35'0"N

29°30'0"N

104°30'0"W

104°25'0"W

104°20'0"W

Mile 0

Mile 1

Mile 2

Mile 3

Mile 4

Mile 5

Mile 6

Mile 7

Mile 8

Mile 9

Mile 10

Mile 11

Mile 12

Mile 13

Scale = 1: 200,000

0 0.25 0.5 1 1.5 2 Miles

0 0.5 1 2 3 Kilometers

Figure 4
Presidio - Ojinaga Flood Control Project

Programmatic EIS
International Boundary and Water Commission,
United States Section

104°30'0"W 104°28'0"W 104°26'0"W 104°24'0"W 104°22'0"W 104°20'0"W 104°18'0"W

Mile 0
Mile 1
Mile 2
Mile 3
Mile 4
Presidio
Mile 5
Ojinaga
Mile 6
Mile 7
Mile 8
Mile 9
Mile 10
Mile 11
Mile 12
Mile 13

104°28'0"W 104°26'0"W 104°24'0"W 104°22'0"W 104°20'0"W 104°18'0"W

N

Scale = 1: 200,000

0 0.25 0.5 1 1.5 2 Miles

0 0.5 1 2 3 Kilometers

Figure 5
Presidio - Ojinaga Flood Control Project, Aerial Photography

Programmatic EIS
International Boundary and Water Commission,
United States Section

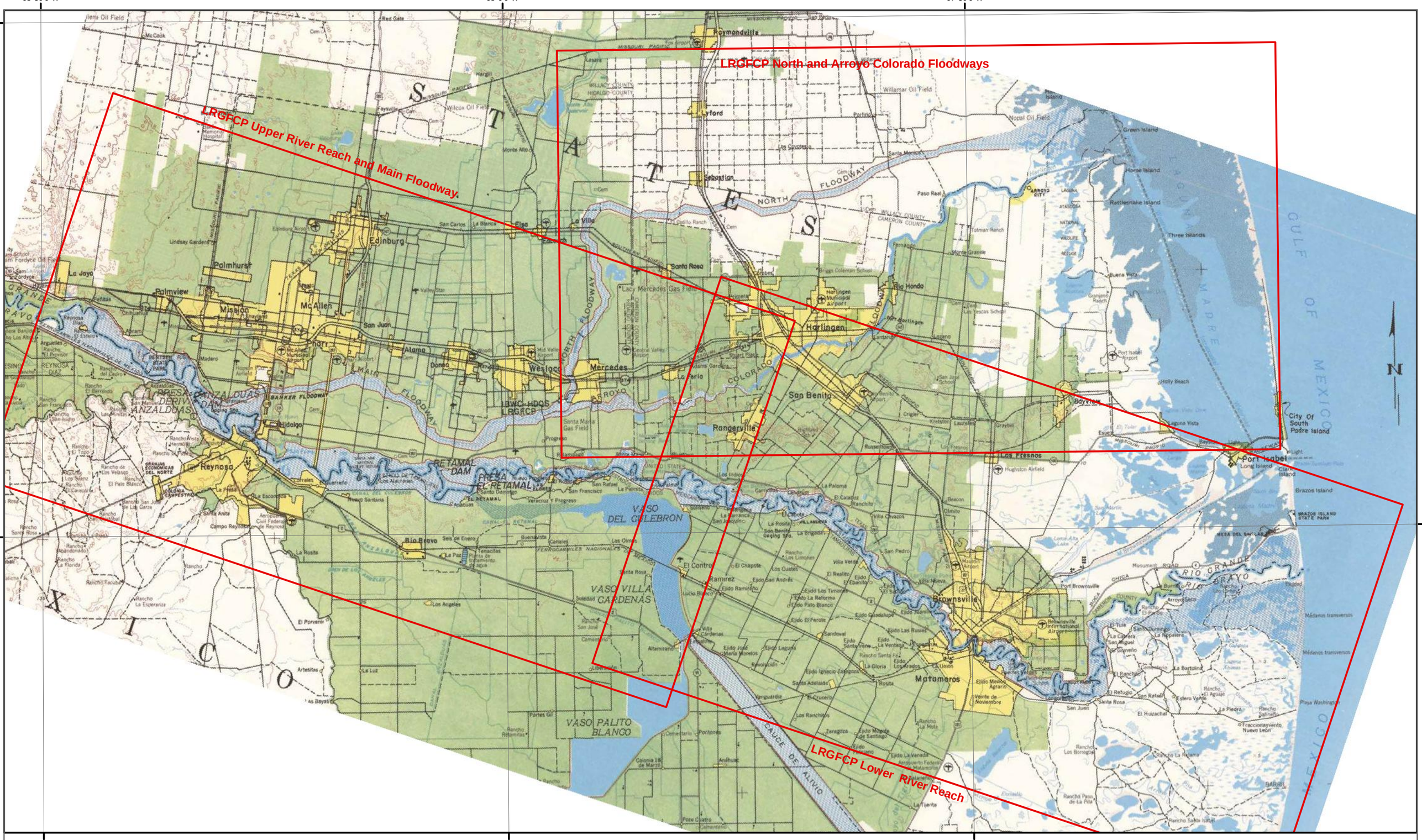


Figure 6
Lower Rio Grande Flood Control Project
Overview Map

Programmatic EIS
International Boundary and Water Commission,
United States Section

98°0'0"W

BEGIN LRGFCP

LBWC-HDOS LRGFCP

98°30'0"W

26°0'0"N

98°0'0"W

Scale = 1: 400,000

0 1 2 4 6 8 Miles

0 1.25 2.5 5 7.5 10 Kilometers

LEGEND

- Irrigated Areas
- Floodway
- Urban Areas

Figure 7
LRGFCP Upper River Reach and Main Floodway

Programmatic EIS
International Boundary and Water Commission,
United States Section

97°30'0"W

LRGFCP ENDS

97°30'0"W

Scale = 1: 400,000

0 1 2 4 6 8 Miles

0 1.25 2.5 5 7.5 10 Kilometers

LEGEND

- Irrigated Areas
- Floodway
- Urban Areas

Figure 8
LRGFCP Lower River Reach

Programmatic EIS
International Boundary and Water Commission,
United States Section

97°30'0"W

97°30'0"W

Scale = 1: 400,000

0 1 2 4 6 8 Miles

0 1.25 2.5 5 7.5 10 Kilometers

LEGEND

- Irrigated Areas
- Floodway
- Urban Areas

Figure 9
LRGFCP North and Arroyo Colorado Floodways

Programmatic EIS
International Boundary and Water Commission,
United States Section

SECTION 2
FORMULATION OF ALTERNATIVES

This section describes how the alternatives were initially identified and processed through the USIBWC, interested stakeholders and government agencies. It further identifies the formulation process to arrive at the alternatives evaluated in the PEIS.

2.1 INITIAL IDENTIFICATION OF POTENTIAL MEASURES

Potential actions and alternatives identified for each flood control project were initially identified by the Engineering, Operations and Environmental Divisions of the USIBWC. A summary description of those actions and alternatives was provided for comment to agencies, state and local governments, organizations, and other potential stakeholders as part of a public scoping process. Findings and conclusions of this process, described in more detail in Section 3.1, were compiled by the USIBWC in the 2005 document *Scoping Meeting Summary, Programmatic Environmental Impact Statement, Rio Grande and Tijuana River Flood Control Projects*. Comments and recommendations submitted during the scoping process were then incorporated into a revised set of preliminary alternatives for evaluation in the PEIS.

Measures initially identified during PEIS development and scoping meetings were consolidated to reflect four major objectives of the flood control projects:

- Ongoing and future activities associated with the *flood control mission* of all projects, namely those associated with maintenance and improvements to the levee system and floodways.

- Ongoing and future activities specifically associated with the *water deliveries and boundary preservation mission*, in accordance with regional and international obligations. Those activities are primarily associated with channel maintenance and sediment removal and management, and apply to the three Rio Grande flood control projects.

- Activities associated with *management of water resources* such as water quality, use and conservation. While this is not a goal inherently associated with the flood control and water delivery project mission, it reflects strategic goals adopted by the USIBWC as an integral part of improved project functionality and cooperation with local initiatives.

- Activities associated with *potential multipurpose use* of the projects, such as additional floodway utilization for purposes other than optimization of flood control, as well as regional environmental initiatives outside the USIBWC jurisdiction. These initiatives would be implemented and managed by other agencies or organizations, and supported through cooperative agreements.

Table I-2.1 presents a summary of potential measures identified for improvement of the Rio Grande flood control projects. Measures are listed according to the main project objectives. Potential applicability of a measure to a given project is also indicated.

Table I-2.1 Potential Changes Relative to Current O&M Practices

	FLOOD CONTROL PROJECT		
	Rectification	**Presidio**	**LRGFCP**
FLOOD CONTROL SYSTEM ALONG THE RIO GRANDE			
Levee Improvements			
Levee height increase	X	X	X
Structural levee improvements	X	X	X
Partial relocation within ROW or new flood easements	X		
Changes in Floodway Management			
Streambank stabilization with vegetation combined with mechanical means			
Changes in vegetation removal and timing/extent of mowing	X		
Agricultural/grazing use			
Restricted Use Zones			X
Changes in Channel Maintenance			
Sediment removal and disposal	X	X	X
Debris removal			
Shore/aquatic vegetation removal			X
New/changes to diversion structures			
INTEGRATED WATER RESOURCES MANAGEMENT			
Water Use and Conservation			
Salt cedar management	X	X	
Revegetation with low-water use species			
Irrigation BMPs to increase water delivery efficiency			X
Wetlands improvement			
Support maintenance of irrigation structures and drains			X
Water Quality			
Water quality monitoring			
Modified irrigation drain maintenance	X		X
Limited floodway revegetation to reduce erosion and sediment load			
MULTIPURPOSE PROJECT MANAGEMENT			
Jurisdictional Floodway Use			
Non-USIBWC floodway maintenance			
Parks, nature trails, recreational areas	X		X
Control of invasive/exotic species	X	X	
Wildlife habitat conservation			
Establish/improve riparian corridors			
Cooperative Agreements and Regional Initiatives			
Vegetation removal and timing/extent of mowing			X
Control of invasive/exotic species outside ROW	X		X
Wildlife habitat conservation inside or outside ROW	X	X	X
Increase backwaters at mouth of arroyos to increase aquatic habitat			
Reconnection of historic, low-elevation meanders for aquatic habitat			
Levee setbacks at flood prone areas for increased habitat			
Flow regime modification to provide year-round baseflow	X		
Watershed management for sediment control			
Upstream sediment control (dams, traps)	X		X

2.2 BASIS FOR ALTERNATIVES FORMULATION

Feasible and likely beneficial measures were identified on the basis of opportunities and constraints for inclusion in the evaluation of potential impacts. The resulting analysis excluded from evaluation those actions that are in conflict with the project objectives, or small-scale measures with minimum potential impacts or environmental benefit. A summary of key considerations for each individual project is presented in Table I-2.2 and briefly discussed below.

Table I-2.2 Opportunities and Constraints for Project Improvement

Opportunities and Constraints	Rio Grande Rectification Project	Presidio-Ojinaga Flood Control Project	Lower Rio Grande Flood Control Project	
			River Segment	Interior Floodways
Flood control objective	Yes	Yes	Yes	Yes
Primary control of floodway management	USIBWC	USIBWC	Federal and state natural agencies / Private / NGOs	USIBWC for use as flood easements
Water delivery and boundary stabilization	Yes	Yes	Yes	No
Dry-weather base flow	Minimum, largely used upstream	Low flow, seasonally variable	Continuous, seasonally variable	Agricultural and municipal return flows
Scale	86 miles	13 miles	186 miles	120 miles
Vegetation and wildlife habitat	Relatively diversified	Relatively diversified	Very diversified	Low diversification
Environmental issues	Limited and mostly known issues	Few and mostly known issues	Complex issues partially addressed	Few and mostly known issues
Ongoing environmental initiatives for floodway use	Few	Few	Multiple by agencies and organizations	Small-scale only
Potential for additional multipurpose use	Moderate	Very limited	Moderate	Very limited

2.2.1 Flood Control

Flood control is a common element to all projects. The need for improved flood control has been identified for the Rectification FCP, Presidio FCP, and Lower Rio Grande FCP. For the Lower Rio Grande FCP, levee improvements are needed, both for the river levee system and for the interior floodways. Implementation of improvements is underway for upstream reach of the levee system, and others are scheduled for implementation in the downstream reach over the next 3 years. Evaluations of potential levee deficiencies have been completed for the Rectification and Presidio FCPs.

Floodway management is a key component of flood control that restricts extensive vegetation development. Floodways in the Rio Grande Rectification and Presidio FCPs are almost entirely under USIBWC management control, providing opportunities for implementation of environmental improvements. In the Rio Grande reach of the Lower Rio

Grande FCP, however, USIBWC jurisdiction is largely limited to narrow corridors along the stream bank and flood control levees; most of the floodway is under private ownership for agricultural use or natural resources management agencies and organizations. Management of the Lower Rio Grande FCP interior floodways, largely used for agriculture, is controlled by the USIBWC as flood easements.

2.2.2 Water Delivery and Boundary Preservation

Water Delivery for irrigation and boundary stabilization are primary functions of the Rectification, Presidio, and river reach of the Lower Rio Grande FCP. These functions are not applicable to the interior floodways of the Lower Rio Grande FCP.

Rio Grande base flow conditions during dry weather are largely controlled by water delivery allocations regulated by upstream diversion dams. The USIBWC maintains the river channel and floodways, but does not have control over the timing or extent of irrigation releases.

Rectification FCP base flow below the American diversion dam is minimal throughout the year because flow is largely diverted upstream of the project for irrigation. A dry streambed is predominant throughout most of the Rectification FCP. The Presidio FCP also has low upstream flow contributions, but the baseline flow becomes more stable downstream from the Rio Conchos, a major Mexico tributary stream. Flows reaching the Lower Rio Grande FCP are mainly controlled by operation of the bi-national Falcon Dam and subsequent return irrigation flows. Base flow decreases along the project as water is withdrawn for irrigation. The downstream end of the Lower Rio Grande FCP, below Brownsville, has a minimum base flow that often causes water ponding and, in recent years, temporary closure of the river mouth into the Gulf of Mexico.

2.2.3 Project Scale and Diversity

Project length and floodway size, as well as topographic diversification, largely dictates the extent of additional flood control actions or environmental initiatives. The Rectification FCP is of a relatively large scale, and has topographic and habitat diversification. A steep terrain is predominant in the downstream reach of the project, resulting in a very narrow floodway. The Presidio FCP also has a predominantly steep topography and a narrow floodway; its short extent and limited floodway provide a low potential for additional flood control or implementation of environmental initiatives.

The river segment of the Lower Rio Grande FCP is extensive and is surrounded by a diversified floodway of multi-purpose use; the land located riverside of the levee system is mostly outside USIBWC jurisdiction. Use of the Lower Rio Grande FCP interior floodways is strictly limited to pasture and seasonal agriculture that precludes development of any wooded vegetation or uncontrolled vegetation growth.

2.2.4 Environmental Initiatives and Cooperative Agreements

Rectification Flood Control Project

Both flood control needs and U.S. Border Patrol operations are primary restrictions to significant vegetation development and implementation of other environmental initiatives along the Rectification FCP. Replacement of non-native wooded vegetation with low water consumption vegetation is the most significant and viable regional initiative identified.

During the scoping meetings, focusing on the Rio Bosque Wetlands, outside the floodway, was proposed as the most effective measure for habitat enhancement since flow in the Rectification FCP flows is heavily regulated by upstream control. Other proposed actions for recommended for evaluation included salt cedar management and control, reduced sediment removal, increased sediment control in tributary arroyos, and disposal of dredged channel material outside the floodway.

Presidio Flood Control Project

Both flood control needs and U.S. Border Patrol operations are primary restrictions to significant vegetation development and implementation of other environmental initiatives along the Presidio FCP. During the scoping meetings, proposed actions for recommended for evaluation included replacement of non-native wooded vegetation with low-water consumption plant species; this measure would be implemented as a regional initiative given the extensive salt cedar infestation upstream of the Presidio FCP.

Lower Rio Grande Flood Control Project

Most of the Lower Rio Grande FCP floodplain along the Rio Grande is under private ownership for use in agriculture or, increasingly over the last 20 years, has been acquired by various agencies and organizations for management of natural resources. In the lower 65-mile reach of the Lower Rio Grande FCP, regulatory decisions by the USFWS and other agencies have defined the extent of vegetation management, largely restricting potential changes. For the most part, USIBWC participation in environmental initiatives has focused on supporting regional environmental initiatives having flood control or water delivery as a significant component. Along the Lower Rio Grande FCP interior floodways, a few environmental initiatives have been identified, such as replacement exotic grass species with native species or limited participation in small-scale wetlands development projects.

The Lower Rio Grande FCP has a steady water flow along most of the stream channel, but its lower reach along the Rio Grande suffers from periodic infestations of water hyacinth and hydrilla that choke the channel. During the PEIS scoping meetings, increased control of these invasive aquatic species was recommended. Also suggested was an increased USIBWC participation in current and future efforts by other agencies, local governments, and organizations for increased use of the Lower Rio Grande Valley as an eco-tourism destination, improving the local economy and promoting habitat enhancement and recreational opportunities.

2.2.5 Mitigation and Compensation Measures

In addition to measures previously identified as components of the alternatives, previously listed in Table I-2.1, a number of measures have been implemented as mitigation in past projects, either directly by the USIBWC, or developed in cooperation with regulatory agencies and other organizations. Mitigation measures are applicable to any given project or alternative, but are not a component of the alternatives for future improvement of the flood control projects. Mitigation and compensation measures currently implemented, or of potential future use, include:

- Compensation for extent or quality of impacted wetlands;
- Revegetation in floodways or construction areas;
- Monitoring and improvement of water quality;
- Site-specific surveys of biological and cultural resources;
- Modified timing or extent of construction or maintenance activities;
- Development or improvement of wildlife habitat corridors;
- Use of in-stream structures to diversify aquatic habitat;
- Off-channel modifications for aquatic habitat development;
- Wildlife habitat improvements outside the jurisdictional ROW, such as conservation easements.

2.3 DEFINITION OF ALTERNATIVES BY PROJECT OBJECTIVE

Measures initially identified during development of the PEIS and scoping meetings were consolidated into a No Action Alternative and three Action Alternatives. Main features of each alternative are summarized below, and a comparative summary is presented in Table I-2.3.

No Action Alternative

The No Action Alternative is the continuation of current management and O&M practices, including actions planned or identified for short-term implementation.

Enhanced Operation and Maintenance Alternative (EOM Alternative)

The EOM Alternative addresses anticipated or likely improvements in flood control and water delivery beyond those to be implemented under current O&M practices. Ongoing and future activities associated with the flood control mission of all projects are those associated with maintenance and improvements to the levee system and floodways. Ongoing and future activities specifically associated with the water deliveries and boundary preservation mission in accordance with regional and international obligations, are primarily associated with channel maintenance and sediment removal and management.

Integrated Water Resources Management Alternative (IWR Alternative)

The IWR Alternative entails addition of measures intended to improve water quality, use and water conservation to improvement measures in flood control and water delivery identified under the EOM Alternative. While not a goal inherently associated with the flood control and water delivery project mission, improving water quality and water conservation reflect strategic goals adopted by the USIBWC as an integral part of enhanced project functionality.

Multipurpose Project Management Alternative (MPM Alternative)

The MPM Alternative incorporates measures under consideration under the EOM and IWR Alternatives, adding measures for multiple use of the floodway and initiatives for environmental improvement. Those measures include additional floodway utilization for purposes other than optimization of flood control, as well as regional environmental initiatives that would be implemented and managed by other agencies or organizations, and supported through cooperative agreements.

Table I-2.3 Measure Organization by Categories used in the Formulation of Alternatives

Measure Category	Enhanced Operation & Maintenance (EOM)	Integrated Water Resources Management (IWR)	Multipurpose Project Management (MPM)
IMPROVED FLOOD CONTROL AND WATER DELIVERY			
Modifications to levee system	X	X	X
Potential for modified floodway management	X	X	X
Modified channel maintenance	X	X	X
WATER RESOURCES MANAGEMENT			
Improved water use and conservation		X	X
Water quality improvement		X	X
MULTIPURPOSE PROJECT MANAGEMENT			
Additional use of jurisdictional floodway			X
Cooperative agreements and regional initiatives			X

SECTION 3
ENVIRONMENTAL COMPLIANCE AND COORDINATION

This section describes the public involvement program that included public scooping meetings, and coordination with various agencies throughout the NEPA process. The environmental review was conducted in accordance with the requirements of Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, as amended, Council on Environmental Quality (CEQ) Regulations (40 CFR Parts 1500-1508), other appropriate regulations, and the USIBWC procedures for compliance with these regulations. The USIBWC regulations for implementing NEPA are specified in *Operational Procedures for Implementing Section 102 of the National Environmental Policy Act of 1969, Other Laws Pertaining to Specifics Aspects of the Environment and Applicable Executive Orders* (46 FR 44083, September 2, 1981).

Copies of the PEIS will be transmitted to federal and state agencies and other interested parties for their review and comment and will be filed with the Environmental Protection Agency in accordance with 40 CFR Parts 1500-1508 and USIBWC procedures.

3.1 PUBLIC AND AGENCY CONSULTATION

3.1.1 Scoping Meetings

Public scoping meetings for the Rio Grande flood control projects along the Texas-Mexico Border were held in the Cities of El Paso, Presidio, and McAllen, Texas (January 11, 13 and 19, 2005, respectively). The USIBWC conducted additional meetings for two projects not included in this PEIS, the Rio Grande Canalization Project located in New Mexico and west Texas (January 12, 2005; meeting in Las Cruces, New Mexico), and the Tijuana River Flood Control Project in southern California (January 27, 2005; meeting in Imperial Beach, California). The Tijuana River Flood Control Project is being concurrently evaluated by the USIBWC under a separate PEIS.

Findings and conclusions of the five scoping meetings were compiled by the USIBWC in the 2005 document *Scoping Meeting Summary, Programmatic Environmental Impact Statement, Rio Grande and Tijuana River Flood Control Projects*. A Scoping Meeting Summary for this PEIS was prepared in March 2005 (USIBWC 2005). This document is an administrative record of public comments received during the December 10, 2004 to February 7, 2005 scoping period.

Full public participation by interested federal, state, and local agencies and organizations as well as the general public was encouraged during the scooping process. Notification of the public meetings was made through letters to agencies, organizations, and individuals; newspaper announcements; and publication of the Notice of Intent in the Federal Register. Each mailing contained a response form on which comments could be written and submitted. An address to mail comment letters was provided in all communication to potential stakeholders. Discussion was encouraged during the scoping meetings and verbal comments

were noted. Comment forms were distributed during the meetings, and turned in during the meeting or mailed to the USIBWC after the meeting (USIBWC 2005).

The Notice of Intent (NOI) to prepare a PEIS was published in the Federal Register by the USIBWC on December 10, 2004. A copy of the NOI is included in the Scoping Meeting Summary report (Appendix A – Item 1 of the (USIBWC 2005).

3.1.2 Notifications to Agencies, Elected Officials, Organizations, and Individuals

The USIBWC mailed a notification letter for the public scoping meetings to 1,647 elected officials, federal/state/local agencies, organizations, and individuals. The letter, mailed December 10, 2004, contained a description of the USIBWC flood control projects, example lists of potential alternatives, and example lists of potential criteria to be used for evaluating alternatives. Dates and times of scoping meetings, and instructions for submitting written comments were included. A response form was included for recipients to return stating their desire to continue or not continue receiving information on the project. A copy of the letter, a blank response form, and the mailing list for notification are included in Appendix A - Item 5 of the Scoping Meeting Summary report (USIBWC 2005).

A Public Notice announcing the purpose, dates and locations of the scoping meetings was published in the legal section of five local newspapers: El Paso Times (December 14, 15, and 16, 2004); Las Cruces Sun News (December 14, 15, and 16, 2004); The International, Presidio, Texas (December 16, 23, and 30, 2004); The Monitor, McAllen, Texas (December 21, 22, and 23, 2004); and San Diego Union-Tribune (December 14, 15, and 16, 2004). Copies of the publisher's affidavits are provided in Appendix A - Item 4 of the Scoping Meeting Summary report (USIBWC 2005).

3.2 PEIS PREPARATION AND REVIEW

3.2.1 Cooperating Agencies

The USIBWC sent letters to federal agencies, state agencies, and tribal governments soliciting their participation as Cooperating Agencies during the NEPA process of the flood control projects. A total of 87 letters were sent on November 16, 2004, and seven responses were received. A sample copy of the request letter is provided in Appendix A - Item 2 of the Scoping Meeting Summary Report (USIBWC 2005). Agencies receiving the request letter and copies of the responses received are shown in Appendix A - Item 3 of the Scoping Meeting Summary report (USIBWC 2005).

Three agencies with geographic jurisdiction over the Rectification FCP, Presidio FCP and Lower Rio Grande FCP agreed to be cooperating agencies in the PEIS preparation:

- United States Army Corps of Engineers (USACE), Galveston District
- United States Bureau of Reclamation (USBR), El Paso Area Office

- United States Fish and Wildlife Service (USFWS), New Mexico Ecological Services Field Office.

Two other agencies also agreed to be cooperating agencies for evaluation of the two projects no longer included within the scope of this PEIS: USACE Los Angeles District, whose jurisdiction covers the Tijuana River Flood Control Project, and the New Mexico Office of Cultural Affairs, Historic Preservation Division, whose geographic jurisdiction includes the Rio Grande Canalization Project.

3.2.2 PEIS Preparation

Technical personnel responsible for preparation and review of the PEIS for the Rio Grande flood control projects along the Texas-Mexico Border are listed in Tables I-3.1 and I-3.2, respectively.

Table I-3.1 Technical Personnel Responsible for PEIS Preparation

Name	Organization	Role / or Resource Area	Discipline / Expertise	Experience
Daniel Borunda	USIBWC	PEIS oversight and coordination, impacts evaluation	M.S. Fisheries and Wildlife Science	12 years Project Manager NEPA Compliance
Carlos Victoria-Rueda.	Parsons	Project management, scoping, impacts evaluation	Ph.D., Environmental Engineering	22 years NEPA and related environmental studies
R. C. Wooten	Parsons	Technical direction, quality assurance	Ph.D. Biology/Ecology	34 years NEPA and related environmental studies
Rosemarie Crisologo	Parsons	Socioeconomic resources	B.S. Biological Science M.S. Environmental Engineering	25 years NEPA and related environmental studies
Anthony Davis	Parsons	Water resources and environmental health	B.S. Civil Engineering	30 years NEPA and related environmental studies
James Hinson	Parsons	Biological resources, impacts evaluation	M.S. Wildlife Science	16 years vegetation and wildlife analyses; field studies supervision
Taylor Houston	Parsons	Wetlands, aquatic ecosystems	M.S, Geography-Environmental Resources	6 years wetlands and land use
Sherrie Keenan	Parsons	Technical editor	B.A., Journalism	28 years technical editor
Justin Kirk	Parsons	Environmental health issues	B.S., Environmental science	6 years environmental health
Namir Najjar	Parsons	Hydrology	Ph.D., Water Resources Engineering	9 years hydraulic modeling
Jill Noel	Parsons	Biological resources, impacts evaluation	M.S. Botany	8 years vegetation and community resources
Angela Schnapp	Parsons	Air quality	B.S. Nuclear Engineering M.S. Environmental Engineering	10 years NEPA and related environmental studies
Nicky de Freese	LGGROUP	Cultural resources	B.A., Archaeology	16 years Cultural resources evaluation

1 **Table I-3.2 PEIS Reviewers**

Name	Agency / Organization	Discipline / Expertise	Experience
Daniel Borunda	USIBWC Environmental Management Division	M.S. Fisheries and Wildlife Science	12 years Project Management, NEPA Compliance
Raymundo Aguirre	USIBWC Engineering Services Division	Ph.D Civil Engineering	49 years
Ron Kuo	USIBWC Engineering Services Division	Ph.D Civil Engineering	26 years
Enrique Reyes	USIBWC, Project Manager Lower Rio Grande FCP	B.S., P.E., Civil Engineering	32 years
Tony Solo	USIBWC, Project Manager Rectification FCP	B.S., P.E., Civil Engineering	32 years
Hector Hernandez	USIBWC, Project Manager Presidio FCP	Operations and Maintenance	25 years
Ernesto Reyes	U.S. Fish and Wildlife Service, Ecological Services	M.S. Biology	15 years
Filiberto Cortez	U.S. Bureau of Reclamation, El Paso Field Office	B.S., P.E. Civil Engineering	32 years

2

DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

IMPROVEMENTS TO RIO GRANDE FLOOD CONTROL PROJECTS ALONG THE TEXAS-MEXICO BORDER

CHAPTER II
RIO GRANDE RECTIFICATION PROJECT

TABLE OF CONTENTS

LIST OF TABLES

SECTION 1
DESCRIPTION OF ALTERNATIVES

This section identifies measures associated with four alternatives for improvement of the flood control projects selected or the PEIS evaluation: a No Action Alternative, the continued implementation of current operation and maintenance (O&M) practices, and three action alternatives: Enhanced Operation and Maintenance (EOM) Alternative, Integrated Water Resources Management (IWR) Alternative; and Multipurpose Project Management (MPM) Alternative. Section 1 also includes an evaluation of actions with potential cumulative effects, and a summary of environmental consequences subsequently evaluated in detail by resource are in Section 3.

1.1 NO ACTION ALTERNATIVE

The Rio Grande Rectification Project, identified in the PEIS as Rectification FCP, was constructed between 1934 and 1938; it extends 86 river miles from El Paso to Fort Quitman, Texas. The purpose of the project is to stabilize the international river boundary and to provide flood protection for both countries in urban, suburban, and agricultural areas. Figures 2 and 3, included in Chapter I, show the project location and main geographic features and structures along the upper and lower reaches of the Rectification FCP, respectively.

The Rectification FCP was constructed by straigthening the river channel and developing a narrow floodway by constructing levees on both sides of the river. The channel straigthening process removed several meanders and resulted in a reduction in the river length from 155 to 86 miles. Four grade control structures were also installed: Island, Tornillo, Alamo, and Guayuco. The average channel depth along the Rectification FCP is 3 to 5 feet. The width of the channel is between 66 and 100 feet and its capacity is 1,000 cfs. The floodway width averages about 590 feet and its capacity is 11,000 cfs. The project includes 85.4 miles of levees on the U.S. side, and 83.7 miles of levees on the Mexico side. The average levee height is 7.2 feet, the average top width is 20 feet.

1.1.1 Levee System Maintenance

The USIBWC conducts the following activities for maintenance of the Rectification FCP levee system, either routinely or on an as-needed basis:

- Grade and resurface maintenance road on levees
- Mow/cut brush/woody vegetation from levee slopes; repair erosion-related damage
- Maintain grass vegetation

Maintenance of levees includes road maintenance, mowing of slopes, and erosion repairs. Maintenance supervisors drive the length of the U.S. levees each week to check condition, and repairs are conducted as needed. Resurfacing of levee roads, using gravel, takes place in a 20-year cycle that requires annual improvements at selected locations. Slopes are mowed continually with farm tractors and rotary slope mowers. Approximately 100 river miles of

levee slope are mowed annually. Bank stabilization is performed as needed or after high flow events, about four to five of which occur per year. Typically after a high flow event, five to six locations are stabilized.

1.1.2 Floodway Maintenance

The USIBWC conducts the following activities for maintenance of floodways of the Rectification FCP, either routinely or on an as-needed basis:

- Mow floodway to control weeds and woody vegetation
- Remove debris in floodway on regular basis
- Perform floodway smoothing to reduce flow resistance

Floodways are leveled annually in areas that need it. Mowing takes place at least twice per year prior to July 15th to remove vegetation and other obstructions from the floodway. Mowing is performed along the entire U.S. floodway with farm tractors using rotary slope mowers. The USIBWC also does special vegetation clearing at the request of the U.S. Border Patrol (USBP). Mowing is not conducted during certain seasons in an area of floodway claimed by the Tiguas, to allow the use of the river for ceremonial purposes, and during Burrowing Owl nesting season. Mowing in this area is conducted at other times of the year. New lighting has recently been installed by the USBP in the floodway from the American Dam to the Zaragoza Bridge.

1.1.3 River Channel Maintenance

The USIBWC conducts the following activities for maintenance of the Rectification FCP river channel, either routinely or on an as-needed basis:

- Remove sediment from channel to maintain conveyance capacity and diversion requirements; removal is performed during non-irrigation periods, and disposal is conducted at designated spoil disposal sited currently in use, or outside the floodway under commercial agreements.
- Stabilize banks using riprap revetment and other structural channel linings.
- Perform structural repairs and modifications to dams, bridges, and other structures on an as-needed basis.
- Excavate arroyo mouths to maintain channel grade and conveyance.
- Adjust gates to maintain pool elevation; divert flows and flush sediment and debris.
- Maintain grade control structures (Island, Tornillo, Alamo and Guayuco grade control structures).

Riprap revetment is used to stabilize stream banks and to repair scour protection of channel invert at utility crossings. Arroyo mouths as well as the main channel are excavated to maintain channel grade and conveyance and ensure irrigation deliveries. Sediment removal is done on an as-needed basis. Sediment is deposited at designated locations in the floodway, uplands, federal and private land, as per existing agreements.

1.2 ENHANCED O&M (EOM)

Possible or likely actions for enhanced O&M of the Rectification FCP in terms of flood control improvements and changes in water delivery are discussed below and summarized in Table II-1.1.

Table II-1.1 Potential Improvements to the Rectification FCP

RECTIFICATION PROJECT	ALTERNATIVE*			Anticipated Change Relative to the No Action Alternative
	EOM	IWR	MPM	
FLOOD CONTROL AND WATER DELIVERY				
Levee Improvements				
Levee height increase	X	X	X	Improvement projects required based on hydraulic modeling; most of the improvements are required in the lower reach
Structural levee improvements	X	X	X	Changes partially required to implement USACE 2004 recommendations
Partial relocation within ROW or new flood easements	X			Changes not anticipated or considered a desirable/viable option for implementation
Changes in Floodway Management				
Vegetation removal and timing/extent of mowing	X	X	X	Changes possible in extent or timing, within current seasonal restrictions
Changes in Channel Maintenance				
Sediment removal and disposal	X	X	X	Changes possible in extent or disposal location (outside floodway under commercial or local agreements), consistent with needs and requirements of domestic and foreign irrigation water deliveries
INTEGRATED WATER RESOURCES MANAGEMENT				
Water Use and Conservation				
Salt cedar management		X	X	Changes possible to develop and implement salt cedar management along the channel and
Water Quality				
Modified irrigation drain maintenance		X	X	Possible cooperation plans with irrigation districts to improve return flow quality
MULTIPURPOSE PROJECT MANAGEMENT				
Jurisdictional Floodway Use				
Parks, nature trails, recreational areas			X	Continued support of initiatives by the City of El Paso and Texas Department of Transportation
Control of invasive/exotic species			X	Implementation possible as part of a regional plan for salt cedar removal
Cooperative Agreements and Regional Initiatives				
Control of invasive/exotic species outside ROW			X	Potential participation in salt cedar removal initiatives identified as a regional priority
Wildlife habitat conservation outside ROW			X	Potential participation as a mitigation action or under a multi-agency habitat conservation initiative
Flow regime modification to provide year-round baseflow			X	Potential participation in a viable regional, multiagency initiative, consistent with authorized uses of Rio Grande Project water
Upstream sediment control (dams, traps)			X	Possible particiaption under interagency agreements (new structures or maintenance of existing structures)

**EOM: Enhanced O&M; IWR: Integrated Water Resources Management; MPM: Multipurpose Project Management*

Improvements to the levee system will entail an increase in height as indicated by the 2003 hydraulic modeling results to meet a 3-foot freeboard criterion for flood control. Levee height increases up to 4 feet are anticipated throughtout the project area, primarily in the Rectification FCP lower reach. Limited structural improvements are also anticipated. While extensive realignment of the levee system is not under consideration, a partial levee realignment is under consideration for the upper reach of the Rectification FCP, in the vicinity of the Riverside Diversion Dam.

Changes in *floodway management* are possible in terms of timing/extent of mowing and wooded vegetation control. Changes would require compatibility with current seasonal restrictions at some project segments due to ceremonial practices by the Tiguas and nesting season of the Burrowing Owl. Greater restrictions on public use/access to the floodway are expected as a result of increased USBP operations (restricted use zones). Small localized projects of streambank stabilization by bioengineered techniques are possible but not anticipated on a large scale. Leases for agricultural use are not anticipated, and the policy of eliminating grazing leases will be continued (non renewal of existing leases).

Changes in *river channel maintenance* would cover primarily sediment disposal outside the floodway through commercial agreements, to minimize or replace use of spoil sites currently in use within the floodway. Timing of sediment flushing from the International Dam could be modified, as allowed by requirements of domestic and foreign irrigation water deliveries. No changes are expected in the timing or extent of activities for debris removal from the channel, currently conducted on an as-needed basis. Changes to water diversion dams or structures, or new construction, are not planned as USIBWC initiatives.

1.3 INTEGRATED WATER RESOURCES MANAGEMENT (IWR)

In addition to those previously discussed for the EOM Alternative, likely future actions for improvements to water resources management, summarized in Table Table II-1.1, are discussed below.

Main improvements to *water use and conservation* are to develop and implement salt cedar management and revegetation with low-water use species along the channel and at arroyo mouths as a regional priority. Another possible improvement is to increase water supply to Rio Bosque Wetlands during the growing season, a measure currently under consideration as a non-USIBWC project. Implementation of irrigation best management practices to increase water delivery efficiency and reduce water losses would be conducted in cooperation with El Paso County Water Improvement District No. 1 and Hudspeth County Irrigation District.

Water quality improvements include continued monitoring to address high chloride and fecal coliform concerns, as well measures to improve water quality in coordination with the two irrigation districts. Those measures include modified irrigation drain maintenance, return flow treatment methods, and maintenance of irrigation structures. Limited floodway revegetation, using grasses, could be implemented in the future to reduce erosion and sediment load in the river.

1.4 MULTIPURPOSE PROJECT MANAGEMENT (MPM)

In addition to those previously discussed for the IWR Alternative, possible actions for multipurpose use of the Rectification FCP are discussed below. Those actions are summarized in Table II-1.1.

Two potential actions are likely to be implemented in the Rectification FCP for *multipurpose use of the jurisdictional floodway.* First, development of plans for parks, nature trails, and recreational areas proposed by local authorities and/or natural resources management agencies or organizations. These plans will likely be limited to the El Paso vicinity given the increased access restrictions by USBP operations. The second action is the control of invasive/exotic species, particularly programs for salt cedar removal, as endorsed by agencies, farming community, and local authorities.

Additional habitat conservation areas and riparian corridors are possible in some relatively undeveloped areas in the lower reach of the Rectification FCP; those actions appear feasible only on a small scale due to conflicts with flood control requirements and/or compatibility with USBP operations. Third-party floodway maintenance is not under consideration.

Cooperative Agreements and Environmental Initiatives would extend beyond USIBWC jurisdiction. Those initiatives, to be implemented and managed by other agencies or organizations and supported by the USIBWC under cooperative agreements, may include:

- Participation in salt cedar removal initiatives identified as a regional priority. This action would be conducted in coordination with the Mexican Government as previously implemented by the U.S. Forest Service at the Big Bend National Park.
- Participation in wildlife habitat conservation initiatives identified as regional priorities, including expansion of backwaters at the mouth of arroyos to increase aquatic habitat as an initiative that requires support from both natural resources management organizations and irrigation districts.
- Flow regime modification to provide year-round baseflow. This change would be viable only as a regional, multi-agency initiative as the USIBWC has no water ownership, or direct control of extent or timing of water releases. The possibility of year round flow would need to be governed strictly by Rio Grande Project authorization of use of Rio Grande Project water.
- Watershed management for sediment control in support of NRCS and/or regional initiatives.
- Agreements for maintenance of existing dams (Alamo, Camp Rice, Diablo, and Macho Arroyos) and/or development of new dams (Guayuco Arroyo) and sediment traps (Alamo and Diablo Arroyos) for upstream sediment control.

Two multi-purpose uses of the Rectification FCP were excluded from evaluation in the PEIS: reconnection of historic, low-elevation meanders eliminated by the project rectification, now located in private lands; and levee setbacks at flood-prone areas for wildlife habitat expansion, a measure not anticipated or considered feasible for USIBWC implementation.

1.5 OTHER ACTIONS WITH POTENTIAL CUMULATIVE IMPACTS

A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts most likely arise when a relationship exists between a proposed action and other actions that are expected to occur in a similar location or during a similar time period. Actions occurring in the same location or in proximity to each other would be expected to have more potential for cumulative impacts than geographically separated actions. Similarly, actions that coincide, even partially, in time would tend to offer a higher potential for cumulative impacts.

Several actions have been identified by the USBP during the same period as those for the USIBWC. The USBP actions would include the full support from Joint Task Force-Six (JTF-6) to the Immigration and Naturalization Service (INS) strategy for enforcement activities within a 50-mile corridor along the U.S./Mexico border. Findings of the INS evaluation are presented in the 2001 document *Final Report, Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities* (USACE, 2001).

The enforcement activities would allow INS to gain and maintain control of the southwest border- area for the purpose of enhancing in the prevention, deterrence and detection of illegal activities. JTF-6's support would fall within three major categories: operational (e.g., conduct of ground patrols Listening Post/Observation Post), engineering (e.g., design and construction of training facilities, buildings, border, roads, fences, and lighting), and general (e.g., data analysis and processing, interpretation of aerial photographs). The actions also include the implementation of INS' Integrated Surveillance Intelligence System, which includes installation and monitoring remote sensing system such as ground sensors, low level television cameras, and remote video surveillance systems. The activities proposed by INS and the support provided by JTF-6 allow INS to conduct its investigation, apprehension and patrolling activities more efficiently and effectively; thus reducing the flow of illegal drugs into the United States.

The Rectification FCP is located within the 50-mile INS enforcement corridor. While INS actions are not part of the alternatives evaluated in this PEIS, they are addressed herein in the context of potential cumulative impacts. Typical INS actions with potential cumulative impacts on the USIBWC flood control project are those associated with floodway use (e.g., vegetation control) and engineering (e.g., road construction and maintenance, and placement of fences and lighting). The analysis of cumulative impacts resulting from incremental effects of the alternatives when added to other past, present, and reasonably foreseeable future actions, is presented in Section 3.7.

1.6 SUMMARY COMPARISON OF POTENTIAL ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

A summary of potential consequences is presented in Table II-1.2.

1 **Table II-1.2 Summary of Environmental Consequences of Alternatives for Improvement of the Rectification FCP**

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Water Resources				
	Without levee system improvements, current containment may be insufficient to fully control severe floods.	Levee system would increase flood containment capacity to control severe floods.	Implementation of water use and conservation measures would improve water resource utilization.	Initiatives that increase floodway vegetation would moderately increase water consumption, but would be offset by improved water resource use.
Biological Resources				
Vegetation	The levee slopes would continue to be mowed on an as-needed basis. The levee slopes would remain primarily invasive grasses.	Levee system improvements would remove vegetation on the levee slopes and at toe of levee. Non-native grasses would rapidly re-establish after construction was complete.	Salt cedar management and revegetation with low water use plants along limited reaches of the project area would increase habitat available for native plant species.	Development of parks and hike and bike trails would remove vegetation in limited areas. Habitat revegetation and conservation along limited reaches of the levee corridor and outside the USIBWC corridor would provide additional habitat for native plant species.
Wildlife	The on-going mowing of the levee slopes and removal of vegetation would maintain this habitat as relatively low-quality for wildlife use.	Removal of non-native vegetation along levee slopes would maintain the relatively low-quality habitat. with very little expected change from the No Action Alternative.	Removal and/or management of salt cedar and revegetation projects would allow re-establishment of native plant species, which would increase habitat available for native wildlife species, particularly birds.	Regional cooperative wildlife conservation, in combination with regional vegetation management would provide additional breeding and foraging habitat for wildlife species, particularly birds.

	No Action Alternative	**Enhanced Operation and Management (EOM) Alternative**	**Integrated Water Resources Management (IWR) Alternative**	**Multipurpose Project Management (MPM) Alternative**
Threatened and Endangered Species	The on-going mowing of the levee slopes and removal of vegetation would maintain this habitat as relatively low-quality for wildlife use.. The low potential for T&E species present in the area would not be impacted.	Removal of non-native vegetation along levee slopes would maintain the relatively low-quality habitat.	Removal and/or management of salt cedar and revegetation projects would allow re-establishment of native plant species, which would increase habitat available for T&E species, particularly birds.	Regional initiatives that preserve and improve foraging and breeding habitat would improve potential habitat for T&E species.
Aquatic Ecosystems	Ongoing removal of invasive aquatic plants and sediment on an as-needed basis would temporarily improve aquatic habitats by improving flow regimes.	Removal of invasive aquatic plants would occur on an as-needed basis, with the same effects as the No Action Alternative..	The effects would be the same as under the No Action Alternative.	Regional initiatives to improve aquatic habitat include increasing backwaters at the mouth of arroyos, and watershed management to improve sediment control would improve habitat for fish and other aquatic species.
Unique or Sensitive areas	Mowing the levee and vegetation removal would not affect unique or sensitive areas.	The effects would be the same as under the No Action Alternative.	The effects would be the same as under the No Action Alternative.	Regional initiatives to acquire and improve sensitive areas would provide additional habitat for wildlife and T&E species, and additional connectivity with adjacent properties.
Wetlands	Mowing the levee and and vegetation removal would not affect wetlands.	Levee footprint expansion may affect wetlands, but effects would be minimized to extent possible.	Increased water flows to the Rio Bosque wetlands during the growing season would improve the habitat for native plants, wildlife, and T&E species.	Regional initiatives to increase water flow to wetlands would improve habitat for native plants, wildlife and T&E species.
Land Use				
Residential Uses	Existing residential communities near the river corridor would not be affected.	Floodway management changes would not affect residential uses.	Land use impacts would include those impacts described under the EOM Alternative.	Land use impacts would include those impacts described under the EOM Alternative.

	No Action Alternative	**Enhanced Operation and Management (EOM) Alternative**	**Integrated Water Resources Management (IWR) Alternative**	**Multipurpose Project Management (MPM) Alternative**
Agricultural Uses	Existing irrigated agricultural lands or rangelands would not be affected.	Floodway management changes would not affect agricultural or rangeland uses within the immediate vicinity.	Land use impacts would be similar to those impacts described under the EOM Alternative.	Land use impacts would include those impacts described under the EOM Alternative.
Recreational Uses	Recreational uses, including the Chamizal National Memorial, the El Paso County Coliseum, and the Ascarate Lake, would not change. The Rio Bosque Wetlands Park would continue to receive water deliveries.	Floodway management changes, including increased U.S. Border Patrol operations, would limit some recreational uses of the floodway.	Land use impacts would be similar to those impacts described under the EOM Alternative.	Land use impacts would be similar to those impacts described under the EOM Alternative. Beneficial effects are expected from multi-jurisdictional, cooperative agreements to promote recreational opportunities, including a trail system under development by the City of El Paso.
Other Uses	Manufacturing and industrial companies would not be affected.	Land use changes would be as described under the No Action Alternative.	Land use impacts would include those impacts described under the EOM Alternative.	Land use impacts would include those impacts described under the EOM Alternative.
Cultural Resources				
Historical Resources	There would be no adverse effects on the 38 historic structures.	Historic structures may be affected by physical changes in the levee configuration or increased levee height.	Historic structures may be affected by physical changes in the levee configuration or increased levee height.	Historic structures may be affected by physical changes in the levee configuration or increased levee height.
Archeological Resources	There would be no adverse effects on the 36 archeological sites.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height.

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Socioeconomic Resources				
Regional Economics	Additional business sales, income or employment from construction would not be generated. Current maintenance practices would continue to inject revenue in wages and expenditures into the regional economy every year.	Levee improvements would generate additional short-term jobs and increased sales volumes for the El Paso and Hudspeth Counties that would last the duration of the project, but would not significantly impact regional economics.	Impacts on regional economics would be the same as the EOM Alternative.	Impacts on regional economics would be the same as the EOM Alternative.
Environmental Justice	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.
Transportation	The transportation system would continue to provide access to residents and the Level of Service (LOS) would not be altered.	Construction activities would include the movement of heavy construction equipment to the site from larger metropolitan areas. Increased use of access roads for movement of heavy equipment may impact commuters, but would last only the duration of the project. During construction. there would be a temporary increase in use of access roads to place equipment in staging areas. The roadways existing LOS would not be affected.	Traffic levels under the IWR Alternative would not vary from the traffic of the EOM Alternative, and LOS on affected roadways would not change.	Traffic levels under the MPM Alternative would not vary from the traffic of the EOM Alternative, and LOS on affected roadways would not change.

	No Action Alternative	**Enhanced Operation and Management (EOM) Alternative**	**Integrated Water Resources Management (IWR) Alternative**	**Multipurpose Project Management (MPM) Alternative**
Environmental Health				
Air Quality	Emissions generating activities would be the same as the current ongoing activities.	A slight increase in localized criteria air pollutants would occur during construction activities. Emissions would be temporary and eliminated after completion of construction activities. Regional air quality would not be impacted.	Additional activities proposed under the IWR Alternative would not impact regional air quality.	Additional activities proposed under the MPM Alternative would not impact regional air quality.
Noise	Due to the flood-prone nature of land within the levees, no sensitive noise receptors are located immediately adjacent to the levees. Therefore, there would be no significant impacts due to noise from current levee maintenance activities.	Similar to the No Action Alternative. Noise from additional construction activities would be intermittent and short-term in duration.	The IWR Alternative would not produce additional noise sources than construction activities, and therefore, the IWR Alternative would not impact noise levels.	The MPM Alternative would not produce additional noise sources than construction activities, and therefore, the IWR Alternative would not impact noise levels.
Public Health and Environmental Hazards	Current maintenance practices such as resurfacing roadways of the levee system and floodway maintenance activities would continue. Exposure to any contamination on the site would not occur, and there are no ongoing remediation activities along or adjacent to the levee system. Impacts to public health and environmental hazards would not occur.	Hazardous materials (*e.g.*, fuel oil, grease, hydraulic fluid) would be used from operating construction equipment. Established industry practices for controlling releases of these products would be used. There are no on-going remediation activities or hazardous waste sites along or adjacent to the levee system. Impacts to public health and environmental hazards would not occur.	Similar to the EOM Alternative. Impacts to public health and environmental hazards would not occur.	Similar to the EOM Alternative. Impacts to public health and environmental hazards would not occur.

SECTION 2
AFFECTED ENVIRONMENT

This section describes resources in the potential area of influence of the Rio Grande Rectification Project (Rectification FCP). Environmental conditions along the potential area of influence of the Rectification FCP have been described in detail in the following three documents which are incorporated herein by reference, as allowed by 40 CFR 1508.02:

- *Final Environmental Impact Statement, El Paso-Las Cruces Regional Sustainable Water Project* (USIBWC and El Paso Water Utilities/PSB 2000).
- *Final Programmatic Environmental Impact Statement for JTF-6 Activities Along the U.S./Mexico Border* (U.S. Army Corps of Engineers [USACE] 1994), *Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities* (USACE 2001).

The data presented in these documents are on a county-level basis and by physiographic province. These discussions are paraphrases of the detailed descriptions provide in the documents mentioned above. They are presented herein merely to acquaint the reader with the project area. If additional information is necessary, the reader should refer to the environmental baseline documents. Current conditions are discussed in Sections 2 and 3 as follows:

- Water resources;
- Biological resources;
- Cultural resources;
- Land use;
- Socioeconomics resources and transportation; and
- Environmental health.

2.1 WATER RESOURCES

2.1.1 Flood Control

The Rectification FCP is of relatively large scale with steep topography and a narrow floodway predominant in the downstream reach of the project. The project was constructed by straightening the river channel and developing a narrow floodway by constructing levees on both sides of the river. The channel straightening process removed several meanders and resulted in a reduction in the river length from 155 to 86 miles. Four grade control structures were also installed: Island, Tornillo, Alamo, and Guayuco. The average channel depth along the Rectification FCP is 3 to 5 feet. The width of the channel is between 66 and 100 feet and its capacity is 1,000 cubic feet per second (cfs). The floodway width averages about 590 feet and its capacity is 11,000 cfs. The project includes 85.4 miles of levees on the U.S. side, and

83.7 miles of levees on the Mexico side. The average levee height is 7.2 feet, the average top width is 20 feet.

2.1.2 Hydrology

Rectification FCP base flow below the American diversion dam is minimal throughout the year because the flows are primarily diverted upstream of the project. A dry streambed is predominant throughout most of the Rectification FCP.

2.1.3 Water Supply and Water Management

The City of El Paso and adjacent county areas rely on groundwater within the Hueco-Mesilla Bolson and surface water supplies from the Rio Grande as common sources for their water supply. The shallow groundwater is closely related to, and greatly influenced by, the Rio Grande and it associated irrigation canals and drains. Repeated agricultural and municipal reuse of these waters along the Rio Grande can lead to increased salinity and can result in exceeding federal and state drinking water standards. Additionally, the increased salinity can influence the quality of the deep aquifers as the Rio Grande discharges into the Hueco Bolson (Texas Parks and Wildlife [TPWD] 1998]).

Most of the flow of the Rio Grande is diverted for irrigation and municipal uses at the American Canal in Texas and the Acequia-Madre Canal in Mexico. Downstream of El Paso, most of the flow consists of irrigation return flow and treated municipal wastewater from the more than 1 million persons living in El Paso and neighboring Ciudad Juarez (TPWD 1998).

Rectification FCP baseflow below the American diversion dam is minimal throughout the year because the flows are primarily diverted upstream of the project. The Rio Grande has historically provided significant water for irrigation in southwestern Hudspeth County where the river overlies the Hueco Bolson. However, the stretch of the river from below Fort Quitman to Presidio is often a dry riverbed. Flows throughout Hudspeth County are determinated by weather conditions in the upper Rio Grande watershed, and operation of storage and diversion dams located upstream of the City of El Paso.

The Rectification FCP is of relatively large scale and offers topographic and habitat diversification. Steep topography and a narrow floodway are predominant in the downstream reach of the project.

Surface water in the Texas Basin and Range Province is located in the Rio Grande basin, which includes the Rectification FCP area. In El Paso County, the Rio Grande's water is diverted into a series of canals (*i.e.,* American, Hudspeth, Riverside, and Franklin) for domestic and irrigation use.

2.1.4 Groundwater Resources

The main aquifer in the Rectification FCP area is the Alluvium and Bolson Deposits which is located in many isolated areas. It is an important source for irrigation and public water

supply. This unconfined system consists of sand, gravel, silt, and clay and ranges in depth from 100 to 1,000 feet but may extend to depths of more than 3,000 feet. Groundwater is the primary source of drinking water in the project area. Groundwater assessments within the project area aquifer indicate that the most common sources for potential contamination include the following: 1) increased chloride/sulfate concentrations along the Rio Grande that exceed Secondary Drinking Water Standards; 2) higher levels of total dissolved solids with levels exceeding 3,000 – 10,000 mg/L; and 3) natural/man-made levels of nitrate (0-20 percent in El Paso County and 41-60 percent in Hudspeth County) and fluoride (0-3 percent) that continually exceed the Federal drinking water standards (USACE 2001).

Given current infrastructure, the groundwater supply in Hudspeth County is projected to be about 151,000 acre-ft per year through 2050. The Bone Spring–Victorio Peak aquifer, capable of providing 93 percent of current groundwater supplies, is the most important source of water in the area. The 2001 Far West Texas Regional Water Plan projects that the aquifer can supply as much as 140,000 acre-ft of water per year for irrigation through 2050. The aquifer also currently supplies the city of Dell City, although the water has to be desalinated. All other water sources in the county are small in comparison (Texas Water Development Board [TWDB] 2005).

Fort Hancock and McNary, located in southwest Hudspeth County above the Hueco Bolson aquifer, have relied on groundwater from one well owned by the Fort Hancock Water Control and Improvement District No. 1 and 11 wells owned by the Esperanza Water Service Company. The 2001 Far West Texas Regional Water Plan indicates that the Fort Hancock Water Control and Improvement District No. 1 well is completed in the Rio Grande Alluvium aquifer, but Texas Water Development Board records suggest that it is actually completed in the Hueco Bolson aquifer. Water quality is an issue in these wells, with total dissolved solids values ranging from about 1,000 mg/L to as much as 2,500 mg/L and fluoride and manganese levels exceeding drinking water standards. The Fort Hancock Water Control and Improvement District No. 1 has plans to drill an additional well (probably in the Hueco Bolson aquifer) and to install a reverse osmosis plant to desalinate produced groundwater to comply with Texas Commission on Environmental Quality drinking water standards. The Esperanza Water Service Company has installed a reverse-osmosis desalination plant to treat its water (TWDB 2005).

2.1.5 Agricultural Water Use

Historically, nearly all of the Rio Grande surface water released by the United States Bureau of Reclamation every year from Caballo Dam and Elephant Butte Dam in Southern New Mexico was utilized for agricultural purposes. However, a growing trend involves transfers from agriculture to municipal and industrial uses. Under the 1906 Convention for the Equitable Division of the Waters of the Rio Grande for Irrigation Purposes, 74 million m^3 per year are diverted to Mexico during normal years. Drought provisions allow for less than that amount to be diverted to Mexico during years in which the Bureau of Reclamation is forced to release smaller volumes from the New Mexico dams. Such instances have occurred on multiple occasions during the mid-1950s, the mid- 1960s, the early and late 1970s and, most recently, in 2003. El Paso County Water Improvement District 1 is the organization that delivers surface water from the Rio Grande to agricultural users within El Paso County (MPRA 2006).

In 2003 and 2004, El Paso Water Utilities purchased about 28,000 acres of land that overlies the Capitan Reef Complex aquifer straddling the Hudspeth and Culberson County lines in an area adjacent to the Salt Basin southeast of Dell City. Possible export of water from this location is not in the current regional and state water plans. Long range planning by El Paso Water Utilities includes the transfer of 10,000 acre-ft per year of groundwater from the Capitan Reef Complex by 2031 through 2060. This project is not listed as a water management strategy in the existing regional or state water plans, but will be added to the next version of the plans (TWDB 2005).

The El Paso County Water district provides irrigation water to approximately 50,000 acres in El Paso County. The water district's normal water allotment is around 376,000 acre-feet. Their current allotment is about 55,000 acre-ft with an initial allocation of 8 inches per acre. The allocation for 2002 was 48 inches per acre (U.S. Department of Agriculture [USDA] 2003).

The Hudspeth County Conservation and Reclamation District (HCCRD) provides irrigation for agricultural producers for about an 18,000-acre area along the Rio Grande that stretches from El Paso County line to Fort Quitman. The most reliable source of the water used for irrigating crops in this district comes from individually owned wells. Water diversions from the river are downstream from El Paso and the diversions are dependent upon water the El Paso district does not use, irrigation tail- water from that district, or releases from water treatment plants. For all practical purposes, Hudspeth County's only reliable source of water at the current time is from individually owned wells. Due to the high salinity content of groundwater in this area the water should be tested and deemed appropriate for crop use before applying it to insured crops (USDA 2003).

2.1.6 Water Quality

The Rectification FCP runs along water quality management Segments 2307 and 2308 of the Rio Grande, as defined by the Texas Commission on Environmental Quality.

Segment 2308 extends from the International Dam to the Riverside Diversion Dam. Flows in Segment 2308 are limited by water diversions upstream at the American and International dams. The designated uses of this segment include limited aquatic life, and non-contact recreation. These designated uses were fully supported according to the 2003 Regional Assessment of Water Quality in the Rio Grande Basin.

Segment 2307 flows 220 river miles from the Riverside Diversion Dam to the confluence with the Rio Conchos, near Presidio, Texas. Flows in Segment 2307 are also minimal and are composed primarily of agricultural and municipal return flows. Designated uses in this segment include contact recreation, public water supply, high aquatic life use, and fish consumption. Water quality information in the Rectification FCP portion of the segment indicates that surface water quality standards are exceeded for chloride and fecal coliform. In addition, ammonia levels are above screening limits, which may be the result of either point or non-point pollution.

2.2 BIOLOGICAL RESOURCES

Biological resources have been described in *Biological Assessment USIBWC Rio Grande Projects: American Dam to Fort Quitman, Texas* (Parsons 2001); *Biological Resources Survey, Rio Grande and Tijuana River Flood Control Projects, Mew Mexico, Texas and California, Final Report* (CDM 2005); *Environmental Baseline, Texas Land Border, Volume Two* (USACE 1994); and *El Paso-Las Cruces Regional Sustainable Water Project, Draft Environmental Impact Statement* (USIBWC and El Paso Water Utilities/PSB 2000). Information from these documents is incorporated by reference. The Rectification FCP is located in El Paso and Hudspeth Counties, Texas.

2.2.1 Vegetation

The Rectification FCP area is within the northern Trans-Pecos region of the Chihuahuan Desert. This region includes all sections of the Chihuahuan Desert in the U.S. and the northernmost sections of the desert of Mexico (MacMahon 1988). Climatic condition throughout the study area is classified as semi-arid continental, characterized by fairly hot summers, mild winters, and short temperate spring and fall seasons. Precipitation averages 7.7 inches per year (Parsons 2001).

The Trans-Pecos region of the Chihuahuan Desert is historically a mosaic of grasslands and desert shrublands (MacMahon 1988; McClaran 1995). The grassland areas are dominated by tobosa, black grama, and other grass species. The dominant desert shrub species are either creosote bush or tarbush or a mixture of the two. Other shrub species and succulents are also present in this area. In areas where washes or rivers are present, riparian vegetation is dominated by willows, cottonwood, and mesquite. Other species such as ash and desert willow may also be present. In the recent past, riparian areas have been degraded, and the invasive salt cedar has attained dominance in many locations (Parsons, 2001).

Along the riparian areas of the Rio Grande, plant communities were historically classified as bosque or deciduous forest, and included cottonwood, willows, Berlandier ash, netleaf hackberry, and little walnut (Crawford, *et al.* 1996).

As a result of clearing native vegetation for agriculture and urban development, relatively small areas of native vegetation remain. El Paso is the most developed urban center within the project area. Adjacent lands along the Rio Grande are primarily agricultural lands (for production of food crops) and rangeland (for the production of dairy cattle and beef cattle).

The levees that were installed to provide flood protection are raised trapezoidal compacted-earth structures, with a crown width of 16 to 29 feet, an average height of 7.2 feet, and side slopes of 2-1/2:1. The levee slopes are grass covered, and are dominated by dropseed. The levee slopes are frequently mowed to prevent the encroachment of woody plants onto the levee slopes.

2.2.2 Wildlife

A number of wildlife species are present in the region. The Rio Grande is a major migratory flyway for numerous bird species, particularly waterfowl, shore birds, and those associated with riparian habitats. The cleared floodplain also provides suitable hunting areas for raptors. Of the variety of birds found in the area, some common species include the great blue heron, red-winged blackbird, western kingbird, burrowing owl, gadwall, mourning dove, and turkey vulture. Terrestrial game animals are sparse due to intensive land use and insufficient food and cover at many locations. The mule deer is the only large game animal known to occur in the region. Other non-game mammals include the coyote, bobcat, spotted skunk, striped skunk, desert cottontail, black-tailed jackrabbit, porcupine, gopher, several species of bats, and several species of rats and mice. Furbearing mammals include the kit fox, gray fox, long-tailed weasel, raccoon, ringtail, badger, beaver, nutria, and muskrat. As in the case of mammals, a small number of reptile and amphibian species are expected to occur in the study area, due to intensive land use and insufficient food and cover at many locations (Parsons, 2001).

2.2.3 Threatened and Endangered Species

Within the Rectification FCP area, there are several species listed as federally threatened or endangered, and several additional species which are listed as threatened or endangered by the State of Texas (TPWD, 2006). The project area is within El Paso and Hudspeth counties, and there are several federal and state listed T&E species, as follows:

- 8 species of birds;
- 2 species of fish (probably extirpated);
- 3 species of mammals (probably extirpated), and;
- 1 species of plant.

See Appendix B for additional details about the T&E species within these counties.

2.2.4 Aquatic Ecosystems

The aquatic ecosystems are restricted to the Rio Grande and the tributaries that flow into the Rio Grande. In this region, the fish fauna are likely to be primarily minnows in the tributaries all or part of their life cycles. In the Rio Grande, the dominant fish species include gizzard shad, red shiner, common carp, river carpsucker, channel catfish, western mosquitofish, and green sunfish (TPWD 1998).

2.2.5 Unique or Sensitive Areas

The Rio Bosque Wetlands Park is present in the Rectification FCP area (see below for additional general wetlands description). The Park was transferred from the USIBWC to the City of El Paso in 1973. In 1995, additional development of the Rio Bosque Wetlands Park was done to mitigate the removal of wetlands for the construction of the American Dam, and the park was developed as a wetlands park. The University of Texas at El Paso (UTEP) volunteered to assume management responsibility for the park. The park is 372 acres and provides valuable habitat for migrating bird species and ongoing projects have developed patches of native vegetation and removed large patches of salt cedar.

The Feather Lake Wildlife Sanctuary is managed by the El Paso/Trans-Pecos Audubon Society. This wildlife sanctuary is a stormwater detention basin for the City of El Paso. Since 1976, Audubon has managed it for wildlife. The sanctuary is 43.5 acres and contains wetlands, riparian woodlands and desert scrub-grasslands at Feather Lake, and provides valuable habitat for birds, particularly migratory water birds.

There are no USFWS or TPWD lands in this region.

2.2.6 Wetlands

Wetlands have been identified as being of particular concern because they perform valuable functions in restoring and maintaining the quality of the nation's waters. These functions include flood water storage, sediment trapping, nutrient removal, chemical detoxification, aquatic food chain support, fish and wildlife habitat, and groundwater recharge. In Texas, wetlands are among the most valuable resources. Additionally, these communities provide many economic and ecological benefits, hunting, fishing, and bird watching opportunities (TPWD 1997). Although wetlands comprise less than 5 percent of its total land area, Texas has the fourth greatest wetland acreage in the lower forty-eight states following Florida, Louisiana, and Minnesota (Dahl 1990).

Diverse wetland types provide habitat for many plant and animal species. Most freshwater fish depend on wetlands for food, spawning, and nursery grounds (Tiner 1984). Texas wetland ecosystems are extremely important to wildlife since the state is one of the most important wintering areas for waterfowl in North America (Stutzenbaker and Weller 1989). Waterfowl utilize wetland plants and animals for food while over-wintering or during migration stopovers. Wetlands are also important breeding areas, and they provide cover for nesting waterfowl and other birds (TPWD 1997).

The USFWS has estimated that from the 1780s to the 1980s, wetland acreage in Texas decreased by 52 percent from about 16 million to about 7.6 million acres (Dahl 1990). Wetlands of every type have been affected. Some of these losses can be attributed to natural causes, but large percentages of the losses were caused by human activities. In rural areas, losses can be attributed to conversion to cropland, declining water levels due to pumping for irrigation, and overgrazing of wetland vegetation by livestock, which can increase erosion and evaporation. In urban areas, wetland losses occur due to encroachment by residential and commercial construction and industrial development. Other activities that can cause wetland

losses are filling, water diversion, drainage and river channelization, clear-cutting, burning, lowering or disturbing the shallow water table, and the construction of dams, reservoirs, flood-control ditches, levees, irrigation canals, and barge and ship canals. Wetland degradation also has resulted from the discharge of inadequately treated sewage and industrial waste into wetlands (TPWD 1997).

Some land use practices have led to the creation of new wetlands or the enlargement of existing wetlands, for example the Rio Bosque wetlands described above. However, those gains have not offset the state-wide losses of natural wetland acreage, function, and value that have occurred.

The wetlands once present along the Rio Grande have been altered due to water control projects and the clearing of native vegetation. Although the wetlands in the Rio Grande Valley have been altered, various sizes and types of wetlands exist throughout the project area. Wetlands in the project area can be classified into three separate systems: lacustrine, palustrine, and riverine, as described below. In addition to these wetlands, there are other man-made waters such as settling basins, ditches, canals, reservoirs, and man-made lakes throughout the project area. These man-made waters are primarily designed for flood control and irrigation purposes; however, these structures are often lined with dense vegetation that supports wildlife and serve as travel corridors for many species.

Lacustrine systems are composed of deepwater habitats and associated wetlands situated in topographic depressions or dammed river channels. Lacustrine wetlands are common in the project area and are associated with the open water of resacas, ponds, lakes, reservoirs, and settling basins. Resacas are old, abandoned river channels that measure from one to six feet deep and 30 to 150 ft wide. Resacas may hold water forming an oxbow lake or only hold water for part of the year. Cattails and willows often dominate the resacas. Resacas provide water for irrigation and support numerous wildlife species. The wildlife and human uses of resacas are dependent on the water quality and the permanency of the water. Very little is known about the water quality of resacas, but some may have decreased water quality due to agricultural runoff and release of sewage during flood events. Siltation has become a major problem within resacas due to the absence of scouring and the increase in urban runoff, shoreline erosion, and general degradation of water quality (Ramirez 1986).

Palustrine systems are all nontidal wetlands dominated by trees, shrubs, and other vegetation, and are very limited within the project area. Palustrine systems are often found around resacas and riparian habitat along the Rio Grande (Moulton *et al.* 1997).

Riverine systems are all wetlands and deepwater habitats within a river channel. The Rio Grande is the dominant riverine system in the project area. Small riverine systems associated with canals and ditches also exist in the project area.

2.3 CULTURAL RESOURCES

Cultural resources in the Rectification FCP are defined as historic properties that are archeological sites or historic structures. In several cases, archeological sites also contain historic structures. Archeological sites in the project area range in date from the Formative

period (A.D. 200 to 1450 [GeoMarine 2005]) to the historic period. Historic structures are defined as those that were constructed 50 or more years ago. For both of these cultural resource types, the project area encompasses all areas that could be either directly affected by the project, or areas where a change could result in indirect effects to cultural resources.

In the Rectification FCP area, previous cultural resources surveys have been conducted, including: GeoMarine (2000), USIBWC and El Paso Water Utilities/PSB (2000), USIBWC (2006a), USACE (2001), and GeoMarine (2005). The baseline cultural resources data for the Rectification FCP area have been identified using these documents, with emphasis on the data contained within the GeoMarine report (2005).

The Geomarine (2005) study compiled previously recorded site data from the Texas Archeological Research Laboratory (TARL) and other cultural resources reports. The results of the study, which identified cultural resources within one-half mile from the north bank of the Rio Grande, found 60 cultural properties or districts. Four of these cultural resources are located in Hudspeth County, and 56 are located in El Paso County. Three of the 60 sites are prehistoric, 54 are historic (including historic archeological sites and standing structures), and three have an unknown temporal component. Of those resources identified, 27 are eligible for the NRHP or are historic districts associated with the City of El Paso.

Within the Rio Grande Rectification FCP area, 95 percent of the previously recorded temporal components are within the floodplain, 33 percent are within the prehistoric floodplain, 67 percent are within the prehistoric terrace/fan, 97 percent are within the historic floodplain, and three percent are within the historic terrace/fan (GeoMarine 2005).

2.3.1 Historical Resources

Within the Rio Grande Rectification FCP area, there are 38 cultural resources containing historic structures. Of these cultural resources with standing structures, 16 are within known archeological sites (GeoMarine 2005).

2.3.2 Archeological Resources

Within the Rio Grande Rectification FCP area, 36 archeological sites have been identified. Three of these are prehistoric, and the remainder are historic (GeoMarine 2005).

2.4 LAND USE

This section characterizes land uses in the immediate and general vicinity where project facilities would be located or where those facilities could cause impacts. This section includes a description of the existing public and private land uses in this portion of the Rio Grande valley of the United States.

2.4.1 Urban Development

The largest concentration of developed land is in El Paso County, where nearly all of the region's residents live. The majority of these persons live within the metropolitan area surrounding the city of El Paso. A few residences are located further east along the corridor, but they are generally isolated and widely-spaced.

Several small communities are located along US Highway 20 and Interstate 10 in eastern El Paso County. Two communities are located approximately two miles from the project corridor (Google Earth 2006-2007).

Community	*General Location*	*Population (2000 U.S. Census)*
Fabens	IH 10 and FM 793	8,043
Tornillo	SH20 and O.T. Smith Road	1,609

The largest concentration of developed land is in El Paso County, where nearly all of the region's residents live. For the portion of the project that runs adjacent to the incorporated city of El Paso and outlying suburban communities, this means a variety of land uses are adjacent to the project. Beginning at the International Diversion Dam, the Paso del Norte Bridge (Santa Fe Bridge) is a major crossing point between the U.S. and Mexico. It is followed immediately by the Good Neighbor Bridge (Stanton Bridge), which is a one-way bridge from the U.S. to Mexico. Surrounding land uses in the immediate vicinity are commercial and industrial in character (Google Earth 2006-2007). Farther east is Chamizal National Memorial Park (National Park Service 2007).

East of the Chamizal National Memorial Park is the Bridge of the Americas, another major international crossing point. Immediately east of that is the El Paso County Coliseum, a major entertainment venue for the metropolitan area. Crossing US 54 to the east, a wastewater treatment plant and more commercial and industrial land uses are found along the northern project boundary shortly before a large residential neighborhood. Next are Ascarate Golf Course and Lake, and another large residential neighborhood. Residential land uses dominate much of the area of El Paso to the east; for the next four or five miles, the only other significant land use is J.P. Shawver Park, which is located adjacent to the project boundary. At Texas Loop 375, the Ysleta-Zaragosa Bridge is another international bridge. Moving east, some industrial land uses (including a wastewater treatment plant) are located within the immediate project area. Approaching San Elizario, residential uses begin to dominate the landscape (Google Earth 2006-2007).

San Elizario is the last significant suburb of the El Paso metropolitan area in the immediate project vicinity. U.S. Census shows the population for this community at 11,406 at the 2000 Census. After San Elizario, the character of the project corridor becomes much more varied, and the developed communities are more widely spaced. Between these communities, the project corridor contains mostly rural and agricultural uses. The next notable land use, traveling east along the project corridor, is the Tornillo-Guadalupe Bridge (Fabens/Hwy 1109), which crosses the project area into Mexico. Continuing east, a few scattered residences are located

within the immediate project vicinity, between U.S. Highway 20 and the project. The next developed area within the immediate project vicinity is Fort Hancock, which is located just inside Hudspeth County, Texas (Google Earth 2006-2007). U.S. Census shows the population for this community at 1,713 at the 2000 Census. East of this small town is FM 1088, where the Fort Hancock-Provenir Bridge crosses the project area into Mexico (Google Earth 2006-2007).

2.4.2 Agricultural Use

The general project vicinity follows a land use pattern similar to the character of the immediate project vicinity. After the fully developed area of urban El Paso, the corridor progresses east into rural and agricultural areas of El Paso and Hudspeth Counties.

Cultivated agricultural lands occupy a small portion of the general project vicinity. With an average annual rainfall of less than 13 inches, the raising of crops in this region requires irrigation. Crops in this area include vegetables, cotton, various grain crops, and fruit orchards. Most irrigated farming occurs along the flood plains of the Rio Grande in both El Paso and Hudspeth Counties, where water is diverted from the river (FWT-WPG 2006).

Rangeland is defined as all areas that are either associated with or are suitable for livestock production, and is the largest category of land use in the region. The dairy industry is located primarily in Hudspeth County.

2.4.3 Recreational Use

Currently, there are no recreational areas in the floodplain of the Rectification FCP. Within the city limits of El Paso, the Chamizal National Memorial is located within the immediate project vicinity. This 55-acre memorial park commemorates the Chamizal Convention of 1963, where a treaty between the U.S. and Mexico settled a century-long boundary dispute. The park includes an outdoor stage, theater, gallery, visitor center, trails and picnic area (National Park Service 2007).

A trail system is under development by the City of El Paso (Rio Grande River Trail and Park) to be operated by the University of Texas at El Paso's Center for Environmental Resource Management. The trail will be located within the U.S. floodplain beginning at Fonseca Drive and extending 4.9 miles to Yarbrough Drive.

Rio Bosque Wetlands Park is a 372-acre park owned by the City of El Paso next to the Rio Grande at the southeast edge of the city, immediately adjacent to the project corridor. The Wetlands Park project is an ambitious effort to restore native wetland and riparian habitats at the site. It is a long-term project now in its early stages. Site preparation took place in 1997 and initial water deliveries were made in winter 1997-98 (County of El Paso, Texas 2006). This multi-agency project includes approximately 30 acres of wetlands supported with effluent from the City of El Paso Bustamante Wastewater Treatment Plant. The El Paso County Coliseum is a major metropolitan entertainment venue immediately adjacent to the project corridor. Key features include the Main Hall, which includes 5,250 permanent seats, additional flexible seating, and floor area up to 88 feet x 210 feet. The Events Center hosts equestrian events, ice skating and ice hockey, and other events. The floor area is 100 feet x 220 feet and permanent

seating is for 1,000. An Outdoor Pavilion and parking lots are also located at the Coliseum site (El Paso County Coliseum 2007).

Ascarate Lake covers 48 surface acres, including a small four-acre lake. Recreation features include canoe and pedal boat rentals, guided pontoon tours, an aquatic center, fishing, trails, baseball, and more. Ascarate Golf Course offers an 18-hole course, a nine-hole course, driving range, clubhouse, restaurant, and other features. The lake and golf course are immediately adjacent to the project corridor (County of El Paso, Texas 2006).

Other parks in the general project vicinity include small neighborhood parks. The following are located in El Paso County (County of El Paso, Texas 2006):

Park	Address	Community
Risinger Park	301 Grace	Fabens
San Felipe Park	16501 Fabens Carlsbad Rd.	Fabens
O'Donnel Park	602 NE 4th St.	Fabens
San Elizario Plaza	1521 San Elizario Rd.	San Elizario

2.4.4 Other Significant Land Uses in the Project Vicinity

Manufacturing and industrial companies represent a significant component of the economy in the general project vicinity. Most of these businesses, however, are located in El Paso County. The degree to which these businesses are concentrated in El Paso County is shown by the fact that all but seven acre-feet of the 14,793 acre-feet of water used in the Region by the manufacturing and industrial sector in the year 2000 was used in El Paso County (FWT-WPG 2006).

2.4.5 Planned Land Uses in the Project Area

El Paso County Master Plan

El Paso County has developed a Master Plan for the southeast portion of the county. Key land uses that would occur in the general and immediate project vicinity include a new port-of-entry between Mexico and the United States. While there is an existing bridge, significant improvements have been approved and are anticipated to begin by the end of 2007. Along with the bridge is a plan to convert the area surrounding the bridge, both north and south of Interstate 10, into agricultural, industrial, commercial and residential land uses. A main water trunk line along Interstate 10 is also proposed that will support commercial and industrial land use in an area that is currently vacant (County of El Paso, Texas 2006).

Included in the Master Plan is an extension of the Border Highway from Zaragoza to San Elizario. The extension of this main artery is needed to reduce traffic congestion on Socorro Road and to promote tourism on the Mission Trail. The Master Plan also includes development of San Elizario into a historic tourist destination (County of El Paso, Texas 2006).

Rio Grande Riverpark Task Force

Another planning effort in the region is focused on providing a contiguous river park along the Rio Grande in the Paso del Norte region by 2010, extending approximately from the New Mexico/Texas state line to Rio Bosque Park. It includes members of El Paso city and county governments, as well as representatives from other stakeholder groups in the area (FWT-WPG 2006). The Riverpark planning effort is also included in the El Paso County Master Plan (County of El Paso, Texas 2006).

2.5 SOCIOECONOMIC RESOURCES AND TRANSPORTATION

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Economic activity typically encompasses employment, personal income, and industrial growth. Depending on local economic and demographic characteristics, the proposed action at the Rectification FCP could potentially influence socioeconomic activity within the surrounding region of influence. Impacts on these fundamental socioeconomic components can also influence other issues such as housing availability.

The socioeconomic region of influence for the proposed project includes El Paso and Hudspeth Counties. Socioeconomic characteristics described for the region of influence would not vary between site alternatives for the Rectification FCP; therefore, the following discussion is applicable to all of the alternatives.

2.5.1 Regional Economics

For the purposes of this programmatic EIS, regional economics includes population, employment/income, and housing.

Population

The Rectification FCP is located within El Paso and Hudspeth Counties. Some of the larger cities within these counties that are adjacent to the levee system include El Paso, Socorro, San Elizario, Fort Hancock, McNary, and Esperanza. Approximately 25 percent of the area between the American Dam and Fort Quitman is considered to be in urban areas and the remaining 75 percent is considered rural. The urban areas are between El Paso and Socorro in El Paso County. The area along the Rio Grande in Hudspeth County is entirely rural.

Table II-2.1 presents population characteristics, including populations in 2000, as well as projected populations for 2005, 2020, and 2030 and the percent change for these statistical areas. As shown in Table II-2.1, the total county population for El Paso is projected to increase 65 percent and from 2000 to 2030 while Hudspeth County is only projected to increase 30 percent.

Table II-2.1
Population Growth in El Paso and Hudspeth Counties Adjacent to the Rectification FCP

Jurisdiction	2000	2005	2020	2030	Percent Change 2000-2030
El Paso County	681,508[1]	721,598[1]	986,443[2]	1,127,206[2]	65%
Hudspeth County	3,344[2]	3,440[2]	4,416[2]	4,314[2]	30%

[1] USCB 2007
[2] TWDB 2006

Employment and Income

The economy of the El Paso region is based primarily on the service, retail trade, and government sectors. El Paso County is also high in the manufacturing and transportation industries. The economy of Hudspeth County is based on agriculture, public administration, services, and manufacturing sectors of the economy (Texas Workforce Commission 2007). The estimated total employment for El Paso and Hudspeth Counties are shown in Table II-2.2. The estimated total employment for the county increased 6.3 percent and 0.16 percent, respectively from 2000 to 2005.

Table II-2.2
Estimated Total Employment for El Paso and Hudspeth Counties djacent to the Rectification FCP

	2000	2005	Percent Change 2000-2005
El Paso County	256,110[1]	272,445[1]	6.3%
Hudspeth County	1,255[1]	1,257[1]	0.16%

[1] Texas Workforce Commission 2007

Median household incomes for El Paso and Hudspeth Counties (reported in 1999 dollars) was $39,927 and $21,045, respectively, whereas the median family income was $45,861 and $22,314, respectively. Per capita income was $19,617 (reported in 1999 dollars) for El Paso County and $9,549 for Hudspeth County (U.S. Census Bureau 2007).

Approximately 12 percent of all families in El Paso County and 32.6 percent in Hudspeth County were reported to be below the poverty level in the 2000 Census (U.S. Census Bureau 2007).

Housing

According to the 2000 U.S. Census, the housing stock in El Paso County was 210,022 and 1,471 in Hudspeth County. Approximately 31 percent of the housing stock in 2000 was

comprised of single-family units while multifamily units accounted for the majority of the housing stock in the county. As shown in Table II-2.3, the number of housing units in El Paso and Hudspeth Counties increased 16 percent and 4 percent, respectively, from 2000 to 2005.

Table II-2.3
Estimated Total Housing Units for El Paso and Hudspeth Counties Adjacent to the Rectification FCP

	2000	2005	Percent Change 2000-2030
El Paso County	210,022[1]	244,193[1]	16%
Hudspeth County	1,471[1]	1,531[1]	4%

[1] USCB 2007

Agricultural Economics

Though agriculture is not considered a major industry within El Paso County, the majority of land adjacent to the RGCP is used for agriculture. Farming and ranching are the two main economic sources in Hudspeth County. Areas on the U.S. side of the Rio Grande starting near the town of Socorro, in El Paso County, downstream to Fort Quitman, in Hudspeth County, are used primarily for this purpose.

2.5.2 Environmental Justice

Executive Order (E.O.) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, encourages federal facilities to achieve "environmental justice" by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Accompanying E.O. 12898 was a Presidential transmittal memorandum, which referenced existing federal statutes and regulations to be used in conjunction with E.O. 12898. One of the items in this memorandum was the use of the policies and procedures of NEPA, specifically that, "Each Federal agency shall analyze the environmental effects, including human health, economic, and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 USC Section 4321, et seq." In this subchapter, relevant data regarding environmental justice is presented, along with an analysis of census tracts that would be affected by flood control management alternatives being considered by the USIBWC for the Rectification FCP in El Paso and Hudspeth Counties, Texas.

Demographic Data

An analysis of demographic data was conducted to derive information on the approximate locations of low-income and minority populations in the community of concern. In developing statistics for the 2000 Census of Population and Housing, the U.S. Department of Commerce, Bureau of the Census, identified small subdivisions used to group statistical census data. In metropolitan areas, these subdivisions are known as census tracts.

Since the analysis considers disproportionate impacts, two areas must be defined to facilitate comparison between the area actually affected and a larger regional area that serves as a basis for comparison and includes the area actually affected. The larger regional area is defined as the smallest political unit that includes the affected area and is called the community of comparison.

Minority Populations

Executive Order 12898 defines a minority as an individual belonging to one of the following population groups: Hispanic, Black (not of Hispanic origin), American Indian or Alaskan Native, Asian or Pacific Islander. Under Executive Order 12898, minority populations are to be identified if: (i) the minority population with the affected area exceeds 50 percent; or, (ii) if the minority population age is meaningfully greater than the age in the general population. The percentage of the population represented by minorities and the poverty rate for each of the selected census tracts in the project area are shown on Table II-2.4. The minority population in El Paso and Hudspeth Counties is 83.1 and 76.9 percent, respectively. Minority populations of Hispanic nationality dominate in the potential region of influence.

Table II-2.4 Percentage of Minority Populations and Poverty Rates in the Project Area

	El Paso	Percent	Hudspeth	Percent
White	502,579	73.9	2,917	87.2
Hispanic or Latino (of any race)	531,654	78.2	2,509	75.0
Black	20,809	3.1	11	0.3
Asian	6,633	1.0	6	0.2
American Indian	5,559	0.8	47	1.4
Poverty (individuals)	158,722	23.8	1,180	35.8
Total Minority		83.1		76.9

Source: U.S. Census Bureau 2007

2.5.3 Transportation

The levee system for the Rectification FCP extends approximately 86 miles from the American Dam in El Paso, TX, to Fort Quitman, TX. The levee system transgresses through the southern portions of El Paso and Hudspeth Counties. Cities within these counties that are adjacent to the levee system include El Paso, Socorro, San Elizario, Fort Hancock, McNary, and Esperanza.

Local, state, and interstate roadways are located throughout the Rectification FCP area. Many of these roadways run parallel or adjacent to the Rio Grande. These roadways are traveled by commuters, commercial vehicles, and tourists. The project would generate traffic during the proposed construction period from construction workers and construction

equipment. The roadways that are expected to be traveled during construction and operation of the proposed project are discussed in this section. The majority of traffic that would be generated would be from the daily commute of construction workers, who are expected to travel to the various levee construction sites from locations within El Paso County and Hudspeth County on these local, state, and interstate roadways.

The transportation system for the two county area is served by a network of federal and state highways which includes Interstate Highway (IH) 10, State Highway (SH) 85, and SH 20. Loop 375 parallels the Rio Grande from the southern and southeastern part of El Paso to Socorro and then turns northerly, crosses IH 10, and continues northwest where it intersects SH 54 in the northern part of El Paso. SH 85 connects to SH 375 in the southern part of El Paso and continues northwesterly along the western portion of El Paso and eventually connects to IH 10 upstream of the American Dam. SH 20 runs parallel to IH 10 and the Rio Grande from the town of McNary and connects El Paso to Las Cruces, New Mexico. IH 10 begins to diverge further east of the Rio Grande near Fort Quitman where it continues on to Sierra Blanca. Just south of McNary, there are several farm-to-market (FM) highways, FM 192, 34, and 2217, that connect to IH 10. FM 192 continues southeasterly towards Indian Hot Springs in the southeast portion of Hudspeth County.

Approximately 25 percent of the Rio Grande between the American Dam and Fort Quitman is considered to be in urban areas and the remaining 75 percent is considered rural. The urban areas are between El Paso and Socorro in El Paso County.

Approximately 43 miles of the Rio Grande is located in El Paso County where the river flows along urban areas adjacent to the western and southern portions of El Paso. The remaining 43 miles of the Rio Grande is located in Hudspeth County, which is entirely rural.

Table 3.6-1 lists the roadways expected to be accessed during construction and maintenance activities on the project along the Rio Grande from the American Dam to Fort Quitman. The 1997 average daily traffic volumes on those roadways, roadway characteristics, and associated level of service (LOS) are also included in the table (CH2M-Hill and Geomarine 2000b).

Driver satisfaction can be measured quantitatively during different levels of traffic congestion. This classification, LOS, measures the congestion on a roadway on a continuum from LOS “A” (free flow) to LOS “F” (traffic jam) conditions. For the areas along the Rio Grande from El Paso to Fort Quitman, LOS “A,” “B,” and “C” are considered to be acceptable roadway operating conditions in urban areas. LOS “D” is considered marginally acceptable; LOS “E” is undesirable; and LOS “F” is considered to be unacceptable congestion levels. The LOS standard for Texas is C (CH2M-Hill and Geomarine 2000b).

Table II-2.5 Roadway Characteristics, Average Daily Traffic and Existing Level of Service

Roadway	Characteristics	Average Daily Traffic	Average Daily Truck Traffic	Existing Level of Service (LOS)
SH 62	4 lanes, paved, 40 mph	53,062	5,306	D
IH 10	4 lanes interstate, paved, 65 mph	40,000	4,000	C
SH 85	2 lines, paved, 55 mph	18,313	1,831	B
SH 20	4 lanes, paved, 60 mph	9,220	922	A
SH 375	4 lanes, paved, 60 mph	40,000	4,000	C
FM 192/2217	2 lanes, paved, 40 mph	4,518	452	A

References: CH2M-Hill and Geomarine 2000b

2.6 ENVIRONMENTAL HEALTH

2.6.1 Air Quality

The Clear Air Act, Title 42, Section 7407 of the U.S. Code, states that Air Quality Control Regions (AQCR) shall be designated in interstate and major intrastate areas as deemed necessary or appropriate by a federal administrator for attainment and maintenance of concentration-based standards called National Ambient Air Quality Standards (NAAQS). The USEPA classifies the air quality within an AQCR according to whether the concentration of criteria air pollutants in the atmosphere exceeds primary or secondary NAAQS. All areas within each AQCR are assigned a designation of attainment, nonattainment, unclassifiable attainment, or not designated attainment for each criteria air pollutant. An attainment designation indicates that the air quality within an area is as good as or better than the NAAQS. Nonattainment indicates that air quality within a specific geographical area exceeds applicable NAAQS. Unclassifiable and not designated indicates that the air quality cannot be or has not been classified on the basis of available information as meeting or not meeting the NAAQS and is therefore treated as attainment. Before a nonattainment area is eligible for reclassification to attainment status, the state must demonstrate compliance with NAAQS in the nonattainment area for three consecutive years and demonstrate, through extensive dispersion modeling, that attainment status can be maintained in the future even with community growth.

Generally, areas in violation of one or more of the NAAQS are designated nonattainment and must comply with stringent restrictions until all of the standards are met. In the case of ozone (O_3), carbon monoxide (CO), and particulate matter greater than 10 micrometers in size (PM_{10}), USEPA divides nonattainment areas into different categories, depending on the

severity of the problem in each area. Each nonattainment category has a separate deadline for attainment and a different set of control requirements under the applicable State Implementation Plan.

The levee system for the Rectification FCP area transgresses through the southern portions of El Paso and Hudspeth counties, and is located within AQCR 153, or the El Paso-Las Cruces-Alamogordo Interstate AQCR. This AQCR includes Doña Ana, Lincoln, Sierra, and Otero Counties in New Mexico, and Brewster, Culbertson, El Paso, Hudspeth, Jeff Davis, and Presidio Counties in Texas. As of April 2005, the USEPA designated air quality within all counties of AQCR 153 to be under attainment status for all criteria pollutants, with the exception of Doña Ana and El Paso Counties (USEPA 2006a). Doña Ana County is designated nonattainment, classification moderate, for PM_{10}, specifically for Anthony, New Mexico. El Paso County, Texas is designated nonattainment, classification moderate, for PM_{10} and, in the case of the City of El Paso, Texas, for CO.

The emissions data for El Paso and Hudspeth counties are used for analysis purposes because the activity associated with the alternatives would be localized in the narrow area along the river, and emissions from the projected activities would not likely affect the more distant counties within the AQCR.

The TCEQ has identified 28 companies and agencies in El Paso and Hudspeth Counties as contributors of point source emissions. Potential stationary point sources of criteria pollutant and hazardous air pollutant emissions within the two counties primarily include manufacturing plants, landfills, refineries, and utilities and gasoline facilities (TCEQ 2006). The combined area and stationary point source emission inventory for El Paso and Hudspeth Counties for calendar year 2001, based on the latest available data from USEPA National Emission Inventory as of August 2005 (USEPA 2006a), is as follows:

- Carbon monoxide, 165,718 tons per year;
- Volatile organic compounds, 22,220 tons per year;
- Nitrogen dioxide, 28,115 tons per year;
- Sulfur oxides, 2,154 tons per year; and
- PM_{10}, 16,539 tons per year.

Existing maintenance activities by USIBWC personnel consists of routine inspections of levees and access roads. Periodic maintenance activities at the levees, channels and floodway results in the use of heavy equipment including scrapers, mowers, bulldozers and dump trucks. Use of these heavy equipment and associated vehicles is typically limited to once every three months or less and does not represent a significant source of air pollutants.

2.6.2 Noise

The characteristics of sound include parameters such as amplitude (loudness), frequency (pitch), and duration. Sound varies over an extremely large range of amplitudes. Noise is

defined as sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying.

The decibel, a logarithmic unit that accounts for the large variations in amplitude, is the accepted standard unit for describing levels of sound. Different sounds have different frequency contents. Because the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent adjustment (*i.e.*, A-weighted sound level in decibels, or dBA) has been devised to measure sound similar to the way the human hearing system responds. The adjustments in amplitude, established by the American National Standards Institute (ANSI) (ANSI 1983), are applied to the frequency content of the sound.

The day-night average sound level (DNL) is a measure of the total community noise environment. DNL is the average dBA over a 24-hour period, with a 10 dBA adjustment added to the nighttime levels (between 10:00 p.m. and 7:00 a.m.). This adjustment is an effort to account for increased human sensitivity to nighttime noise events. DNL was endorsed by the USEPA for use by federal agencies.

Potential adverse effects of noise include annoyance, speech interference, and hearing loss. Noise annoyance is defined by the USEPA as any negative subjective reaction to noise by an individual or group. Typically, 15 to 25 percent of persons exposed on a long-term basis to DNL of 65 to 70 dBA would be expected to be highly annoyed by noise events, and over 50 percent at DNL greater than 80 dBA (National Academy of Sciences 1977).

In a noisy environment, understanding speech is diminished when speech signals are masked by intruding noises. Based on a variety of studies, DNL 75 dBA indicates there is good probability for frequent speech disruption. This level produces ratings of "barely acceptable" for intelligibility of spoken material. Increasing the level of noise to 80 dBA reduces the intelligibility to zero, even if the people speak in loud voices.

Hearing loss is measured in dBs and refers to a permanent auditory threshold shift of an individual's hearing. The USEPA (USEPA 1974) recommended limiting daily equivalent energy value of equivalent sound level of 70 dBA to protect against hearing impairment over a period of 40 years. Hearing loss projections must be considered conservative as the calculations are based on an average daily outdoor exposure of 16 hours.

Existing maintenance activities by USIBWC personnel consists of routine inspections of levees and access roads. Periodic maintenance activities at the levees, channels and floodway results in the use of heavy equipment including scrapers, mowers, bulldozers and dump trucks. Use of these heavy equipment and associated vehicles is typically limited to once every three months or less and does not represent a significant source of noise

It is recommended that no residential uses, such as homes, multi-family dwellings, dormitories, hotels, and mobile home parks, be located where the noise is expected to exceed a DNL of 65 dBA. Some commercial and industrial uses are considered acceptable where the noise level exceeds DNL of 65 dBA. For outdoor activities, the USEPA recommends DNL of 55 dBA as the sound level below which there is no reason to suspect that the general population will be at risk from any of the impacts of noise (USEPA 1974).

Land-use and zoning classifications surrounding the project areas provide an indication of potential noise impact. Land use in the Rectification FCP area is urban in the upper portions associated with El Paso, while the majority of the remaining areas are agricultural.

2.6.3 Public Health and Environmental Hazards

Hazardous materials are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act and the Toxic Substances and Control Act. Hazardous wastes are defined under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA). In general, both hazardous substances and wastes include substances that, because of their quantity, concentration, and physical, chemical, or infectious characteristics, may present a danger to public health and/or welfare and to the environment when released or improperly managed.

Waste disposal activities at or near the Rectification FCP area were reviewed to identify areas where industrial processes occurred, solid and hazardous wastes were stored, disposed, or released; and hazardous materials or petroleum or its derivatives were stored or used. A data search on waste storage and disposal sites was conducted on January 9, 2007 using EnviroMapper for Envirofacts, an internet service provided by USEPA (USEPA 2007a). EnviroMapper combines interactive maps and aerial photography to display facility-based environmental information as filed with state agencies and reported to the USEPA. Information includes air releases, toxic releases, hazardous wastes, water discharge permits, and Superfund sites. Below is a list of the facility types that were queried for the Rectification FCP area.

- Superfund Sites: Indicates the specific facilities designated as Superfund sites by the USEPA.
- Toxic Release Sites: Indicates the specific facilities regulated by the USEPA that release toxic substances into the environment, as found in the Toxics Release Inventory database.
- Water Dischargers: Indicates USEPA regulated municipal and industrial wastewater treatment facilities discharging water into rivers, streams, lakes, and other waterways.
- Hazardous Waste Sites: Indicates Resource Conservation and Recovery Act sites and/or facilities regulated by the USEPA that handle materials designated as hazardous waste.
- Multi-Activity Sites: EnviroMapper allows you to query sites that show up on multiple databases for facility information.

The search extended along the Rectification FCP area, up to 1 mile from the levee corridor centerline. No Superfund sites were identified for the Rectification FCP area. Within 1 mile of the levee centerline, 14 toxic release sites, 158 hazardous waste sites, and 6 multi-activity sites were identified in the query, all of which were located within the City of El Paso. Two water dischargers were identified in the query, one within El Paso and the other near the community of Tornillo.

SECTION 3
ENVIRONMENTAL CONSEQUENCES

This section describes potential environmental consequences in the same sequence as those discussed in the affected environment: water resources; biological resources; cultural resources; land use; socioeconomics resources; and environmental health issues.

3.1 WATER RESOURCES

Impacts to water resources would be considered significant if any of the following were to occur: substantial flooding or erosion; adverse effects on any significant water body (such as stream, lake, or bay); exposure of people to reasonably foreseeable hydrologic hazards such as flooding; or, adverse effects to surface or groundwater quality or quantity. Impacts on water quality would be considered significant when concentrations of indicator parameters exceeded regulatory values for protection of human health and aquatic life.

3.1.1 No Action Alternative

Under the No Action Alternative, O&M of the Rectification FCP would not change from the current management practices. The levee system and current levels of protection associated with the flood control system, water supply, and water management would remain unchanged from current conditions and maintenance practices. Under severe storm events, current containment capacity may be insufficient to fully control Rio Grande flooding with risks to personal safety and property.

3.1.2 Enhanced Operation and Maintenance Alternative

Improvements to the Rectification FCP levee system would increase flood containment capacity to control a 100-year storm event. Vegetation and sediment removal would improve floodway and channel conditions. The significance and extent of impacts to water resources would be evaluated on a project and site-specific basis. Conformance with federal regulations and coordination with state and local agencies regarding surface water impacts would be required. Notification and permitting procedures for specific proposed actions would be evaluated for each site-specific project prior to construction activities. Best management practices for preventing contamination from storm water runoff during construction activities would be specified in mitigation plans and implemented accordingly. The use of non-potable water during construction would depend upon the climatic conditions and the need to suppress fugitive dust. Water for dust suppression would typically be obtained from nearby surface water bodies or non-potable water wells. Withdrawal permits would be obtained prior to initiation of project activities. No releases of hazardous materials to any ground surface or water drainage would be allowed. Accidental spills or leaks of hazardous materials would be controlled and contained to avoid potential impacts to water resources.

3.1.3 Integrated Water Resources Management Alternative

This alternative includes the same construction activities as the EOM Alternative. Therefore, the analysis and conclusions associated with water resources from the IWR

Alternative would be the same as the EOM Alternative. In addition to these construction activities, the IWR Alternative includes water use and conservation measures such as salt cedar management and modified irrigation drain maintenance for to improve water quality. The demand for water use would decrease as a result of salt cedar removal.

3.1.4 Multipurpose Project Management Alternative

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives. Therefore, the analysis and conclusions associated with water resources from the MPM Alternative would be the same as the EOM and IWR Alternatives. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives. The possibility of year round flow or other changes in water use would be conducted in close coordination with the U.S. Bureau of Reclamation, and strictly governed by Rio Grande Project authorization of RioGrande Project water use, and requirements of the 1906 Convention and the 1944 Water Treaty between the United States and Mexico. Additionally, control of invasive/exotic species, particularly for salt cedar removal, would require endorsement by agencies, farming community, and local authorities. The MPM Alternative would not be considered significant for water resources

3.2 BIOLOGICAL RESOURCES

Biological resources analyses used the following evaluation criteria to assess the impacts of the alternatives:

- Diminished habitat for plant or animal species;
- Diminished population sizes of regionally important plant or animal species; and
- If the project would interfere with or improve movement of animal species.

3.2.1 No Action Alternative

Vegetation

No changes would be made to improve the levees, to change the floodway management or to change the channel maintenance activities, and therefore no changes to the vegetation in the area would occur. There are currently no agricultural leases and no new leases would be administered. The levee slopes would continue to be mowed on an as-needed basis. The levee slopes would remain primarily invasive grasses that would rapidly re-grow after disturbances such as mowing.

Wildlife

No changes would be made to improve the levees, to change the floodway management or to change the channel maintenance activities, and therefore no changes to the vegetation in the area would occur. If no vegetation changes occur in the area, there would be no expected changes to wildlife habitat. The on-going mowing of the levee slopes would maintain this habitat as relatively low-quality for wildlife use, except as transit corridors.

Threatened and Endangered Species

No changes would be made to improve the levees, to change floodway management, or to change the channel maintenance would occur. Therefore, there would be no expected changes to current habitat occupied by threatened and endangered species. The on-going mowing of the levee slopes would maintain this habitat as relatively low-quality, except possibly as a transit corridor.

Several T&E bird species and one plant species which are likely to occur in the project area have been described in Parsons (2001), and are summarized below.

The Interior Least Tern habitat requirements include the presence of bare or nearly bare alluvial islands or sandbars, favorable water levels during nesting season, and food availability (mainly fish). Within the project area, there is limited suitable habitat for foraging and resting (beaches and sandbars), and there is no suitable nesting habitat available in the project area. On-going sediment removal operations under the No Action Alternative may reduce resting and feeding habitat for reducing the numbers of sandbars and beaches in the study area. The No Action Alternative will not adversely affect the species.

The Piping Plover wintering habitat requirements in Texas include beaches, sand and mudflats, and dunes along the Gulf Coast. There is very limited marginal habitat (beaches and sandbars) within the Rectification FCP area that may be utilized for resting and feeding sites during migration. Suitable nesting habitat does not occur within the study area. On-going sediment removal operations under the No Action Alternative may reduce resting and feeding habitat by reducing the numbers of sandbars and beaches in the study area. The No Action Alternative will not adversely affect the species.

The Northern Aplomado Falcon nests in trees or shrubs, laying eggs between March and June. The general habitat requirements include open desert terrain with scattered trees, relatively low ground cover, an abundance of small to mediums-sized birds as a food source (supplemented with insects, small snakes, lizards, and rodents), and a supply of previously constructed nests, and above ground nesting substrate such as yucca and mesquite. Within the project area, there is not suitable habitat for foraging or nesting. The No Action Alternative will not adversely affect the species.

The Mexican Spotted Owl nest in trees, crevices, or small caves and tend to prefer north facing slopes. The species occurs primarily in forested and canyon habitats, and in Texas occur on cliffs at 5,000 to 7,000 feet in elevation in deep, cool canyons. Within the project area, there is no suitable canyon habitat available. The No Action Alternative will not adversely affect the species.

The Southwestern Willow Flycatcher typically breeds in dense riparian habitats along river, streams, or other wetlands. Vegetation can be dominated by dense growth of willows, seepwillow, or other shrubs and medium sized trees. Nesting may occur in any of these species, and also in salt cedar, box elder, and Russian olive. All nesting habitat trees and shrubs have to have a specific plant and twig structure, regardless of species. Although salt cedar does exist along the river banks, these communities to not meet the minimum patch size and density requirements for the species. The No Action Alternative will not adversely affect the species.

The Bald Eagle typically breeds in the eastern third of the state. The Bald Eagle is a bird of aquatic ecosystems (generally near estuaries, large lakes, reservoirs, major rivers, and coastal habitats). Nest sites are typically large trees along shorelines. Within the study area, there are few trees of suitable size to support the large nests of the bald eagle, and limited supplies of fish to attract the eagles to the area for nesting or roosting. The No Action Alternative will not adversely affect the species.

Western burrowing owls are considered a species of concern within the area. The habitat requirements of the western burrowing owl includes open grasslands, especially prairies, plains, and savannas. In addition, the birds will tolerate a certain amount of human disturbance (*e.g.*, traffic on levee roadways). The owls have been observed in the Rectification FCP area (Parsons, 2001). The on-going mowing operations under the No Action Alternative may affect, but are not likely to adversely affect, the burrowing owl. Mowing operations occur outside the breeding season of the owl.

Migratory bird species are present throughout the Rectification FCP area. As for the interior least tern and the piping plover, limited marginal habitat exists within the study area that may provide resting and feeding sites for waterfowl and shorebirds. On-going sediment removal operations may reduce the amount of available beach and sandbar habitat. It is also possible that migratory birds may be temporarily displaced during maintenance operations. However, there is little suitable nesting habitat for the majority of migratory birds due to on-going maintenance operations, and the No Action Alternative is not likely to adversely affect migratory bird species.

In addition to the bird species summarized above, Parsons (2001) evaluated a T&E plant species, the Sneed Pincushion Cactus. The habitat for the species is in grasslands or shrublands on limestone outcrops and rocky slopes of mountains within the Chihuahuan Desert. Although there are reports of the species in El Paso County, it is found in the limestone ledges greater than 4,300 feet in elevation. Within the project area, there is no suitable habitat present. The No Action Alternative will not adversely affect the species.

Aquatic Ecosystems

Sediment removal and disposal would continue on an as-needed basis. Aquatic vegetation would continue to be removed on an as-needed basis. Ongoing removal of invasive aquatic plants will temporarily improve aquatic habitats by improving flow regimes. The effect will last only until the aquatic vegetation regrows and slows water flow.

Unique or Sensitive Areas

No changes would be made to improve the levees, to change floodway management, or to change channel maintenance. Therefore, existing unique or sensitive areas will not be affected by the No Action Alternative. Under the No Action Alternative, no suitable habitat for threatened and endangered species within the sensitive areas would be removed.

Wetlands

No changes would be made to improve the levees, to change floodway management, or to change channel maintenance. Therefore, existing wetlands adjacent to the levees will not be affected by dredge and fill operations, by expansion of the levee footprint, or other operations that would inhibit wetland function. Wetlands are not affected by current mowing practices.

3.2.2 Enhanced Operation and Maintenance Alternative

Vegetation

Levee System. Improvements to the levee system that will improve flood control have the potential to affect vegetation. To meet flood control and water delivery obligations, the levee height will be raised in the upper reaches of the Rectification FCP (approximately river miles 0-2 and 15-17) and in more extensive areas in the lower reach of the Rectification FCP (approximately river miles 48-52, 59-62, 65-76, and 80-91). In addition to raising the levee, limited structural improvements may be required. Increases in levee height will concomitantly increase the levee footprint. Vegetation would be removed on the levee sidewalls where fill would be added and within the expanded levee footprint. The vegetation of the levee sidewalls is generally composed of invasive grasses that are expected to rapidly reestablish in the area. Structural improvements would remove vegetation on the levee sidewalls. Grasses are expected to rapidly re-establish after the structural improvements are completed.

Floodway Maintenance. The vegetation management may change within the current seasonal restrictions. The changes in vegetation management would include changes in timing and extent of mowing. Depending on the extent of changes in mowing regime, the vegetation communities may be altered. If the mowing occurred during a different season, habitat for native species establishment may be available. However, because the changes in the mowing regimes would occur within seasonal restrictions, it is unlikely that invasive species abundance would be reduced. The long-growing season of the region allows invasive species to re-establish during the same season, even if mowed earlier in the same season. This is particularly true for species such as salt cedar.

River Channel. Sediment removal from the river channel and removal of aquatic invasive species (*e.g.*, water hyacinth and hydrilla) would continue on an as-needed basis. Removal of invasive aquatic plants is not expected to affect terrestrial vegetation communities.

Operation and Maintenance of Interior Floodways. Some levee height increases for flood protection are anticipated, and the vegetation changes would be as described above. Golf course uses would not be affected.

Wildlife

Levee System. Improvements to the levee system that will improve flood control have the potential to affect vegetation. If the levee height is increased in some areas and plant communities altered, the wildlife resources may be affected. Removal of invasive grasses on the levee sidewalls is unlikely to affect wildlife, as these grasses will rapidly re-establish, and the overall habitat quality will not change. The levee slopes and adjacent areas provide low-quality wildlife habitat, and are likely only utilized as transit corridors. Most of the wildlife species present are tolerant of some level of human disturbance, and this would not change with levee footprint expansion.

Floodway Maintenance. Because the vegetation management in the lower reaches of the Rectification FCP is not likely to change substantially from the on-going mowing operations and vegetation removal, there are no expected impacts to wildlife resources.

River Channel. Sediment removal from the river channel and removal of aquatic invasive species (*e.g.*, water hyacinth and hydrilla) would continue on an as-needed basis. Terrestrial

wildlife species will not be affected by these activities. Aquatic wildlife species may benefit from these activities, where improved water flows enhance habitat.

Operation and Maintenance of Interior Floodways. Some levee height increases for flood protection are anticipated, and the vegetation changes would be as described above, but wildlife species are not expected to be affected, except as described above.

Threatened and Endangered Species

Levee height increases will remove some vegetation, and the concomitant footprint expansion may remove habitat that may be utilized by T&E species. On-going mowing operations will affect T&E species as described under the No Action Alternative. Changes in the timing and extent of mowing operations under the EOM Alternative may affect burrowing owl nests, but the changes would require compatibility with the owl nesting season. The EOM alternative will have no adverse effect on the T&E species described under the No Action Alternative.

Aquatic Ecosystems

Removal of invasive aquatic plants will occur on an as-needed basis, which is the same as the No Action Alternative. No modifications will be made to the levees that will affect fisheries or aquatic ecosystems.

Unique or Sensitive Areas

Under this alternative, it is not expected that the unique or sensitive areas in the project area will be affected.

Wetlands

With levee expansion, it is possible that wetlands may be affected. Direct and indirect impacts to wetlands will be minimized to the extent possible, but if wetlands will be affected by levee expansion, then appropriate USACE permits will be required. If wetlands are impacted, this may alter suitable resting habitat for migratory birds.

3.2.3 Integrated Water Resources Management Alternative

Vegetation

In addition to the actions under the EOM Alternative, the impacts to vegetation may also include management of salt cedar along limited reaches of the project areas. The effect of salt cedar management will be to provide habitat for native plant species. The IWR Alternative also includes revegetation of limited reaches of the project area with low-water use plant species. This action would also increase habitat for native plant species.

Wildlife

The IWR Alternative effects on wildlife will include the actions described in the EOM Alternative, and the removal and/or management of salt cedar and revegetation with low-water use plant species will provide habitat for native plant species. The establishment of native plant species will in turn provide habitat for native wildlife species, particularly birds.

Threatened and Endangered Species

The IWR Alternative to threatened and endangered species will include the actions of the EOM Alternative, and, as for other wildlife species, the removal and/or management of salt cedar and revegetation of limited reaches of the project area will improve native habitat. If native plant species are more abundant, it is possible that threatened and endangered species that depend upon native species will concomitantly increase in abundance, with more available breeding and foraging sites. Under the IWR Alternative, there will be no adverse effects to the species described under the No Action Alternative.

Aquatic Ecosystems

There will be no additional changes to the aquatic ecosystems from the No Action Alternative.

Unique or Sensitive Areas

No changes to unique or sensitive habitats will occur under this alternative.

Wetlands

Under the IWR Alternative, the water flow to the Rio Bosque wetlands may be increased during the growing season to improve species survival, and this will likely be part of a cooperative agreement with the City of El Paso and the El Paso Water Utilities and El Paso County Water Improvement District No. 1. This action would improve habitat for native species and possibly improve habitat for threatened and endangered species. In addition, this action would provide better habitat for migratory species that utilize the area as a stop-over during migration.

3.2.4 Multipurpose Project Management Alternative

Vegetation

In addition to the actions for the IWR Alternative, there are several actions for the MPM Alternative that might affect vegetation. In general, the actions described for the MPM Alternative include regional initiatives, outside the USIBWC scope, and these actions would require multi-agency cooperation to achieve. The action to implement multipurpose use of the jurisdictional floodway in the El Paso area would increase the use of the floodway through development of parks and hike and bike trails. This action would affect the vegetation by removing some vegetation in limited areas. The vegetation removed would likely be invasive grass species, and no removal of thornscrub habitat would be expected. In addition to this action, habitat conservation in riparian corridors may be implemented along very limited reaches of the project area. Extensive salt cedar management or revegetation activities are not expected, as the conflicts with flood control management and USBP activities limit the extensive vegetation of wooded habitats.

Additional regional activities and cooperative agreements would extend beyond USIBWC jurisdiction, but regional cooperative agreements that may affect vegetation may include such actions as control of invasive species outside the USIBWC right-of-way. This action would provide additional habitat for native plant species.

Wildlife

Wildlife resources under the MPM Alternative rely primarily on cooperative agreements for areas outside USIBWC jurisdiction. The regional initiatives that may affect wildlife resources may include such actions as wildlife conservation outside the USIBWC right-of-way. This action, in combination with the regional vegetation initiatives above, would provide additional breeding and foraging habitat for a number of wildlife species, particularly birds. These initiatives have the potential to increase suitable habitat for both resident and migratory species.

Threatened and Endangered Species

As for other wildlife species, regional initiatives that preserve and restore suitable wildlife habitat will improve foraging and breeding habitat for threatened and endangered species, both resident species and migratory species. Under the MPM Alternative, there will be no adverse effects to the species described under the No Action Alternative.

Aquatic Ecosystems

Aquatic Ecosystems under the MPM Alternative will also rely on regional initiatives to improve habitat. Regional initiatives to improve aquatic habitat may include such actions as increasing the backwaters at the mouth of arroyos, to increase the amount of aquatic habitat available. This initiative would involve cooperation between the USIBWC, natural resources management organizations (*e.g.*, USFWS, TPWD), and the local irrigation districts. Another multi-agency, regional initiative that may affect aquatic ecosystems resources includes watershed management for sediment control. Both regional initiatives would improve the quantity and quality of breeding, foraging, and nursery habitat for aquatic species, but increased sediment removal may remove sandbars and shoals that may be suitable resting places for interior least tern, piping plover, and other migratory bird species. This aquatic habitat is very limited within the project area under on-going sediment removal operations, and additional sediment removal under the MPM Alternative will not further degrade the sandbar habitat. Regional initiatives that may affect wetland resources may include initiatives to modify flow regimes to provide year-round baseflow of water. The USIBWC has no control over water releases upstream, but if the baseflow were increased, it would be expected to improve species survival in wetlands, improve aquatic habitats, and possibly reduce the extent of invasive aquatic vegetation.

Unique or Sensitive Areas

Unique or sensitive areas within the USIBWC jurisdiction would not be affected by actions under the MPM Alternative. If additional lands were acquired outside the USIBWC right-of-way, these areas would provide additional habitat for wildlife and threatened and endangered species, and additional connectivity between adjacent properties.

Wetlands

Regional initiatives that may affect wetland resources may include initiatives to modify flow regimes to provide year-round baseflow of water, as described in Aquatic resources above.

3.3 CULTURAL RESOURCES

Cultural resources in the Rectification FCP are defined as historic properties that are archeological sites or historic structures. In several cases, archeological sites also contain historic structures. Archeological sites in the project area range in date from the Formative period (A.D. 200 to 1450 [GeoMarine 2005]) to the historic period. Historic structures are defined as those that were constructed 50 or more years ago. For both of these cultural resource types, the project area encompasses all areas that could be either directly affected by the project, or areas where a change could result in indirect effects to cultural resources.

The responsibility of the USIBWC toward cultural resources is to address the requirements of the National Historic Preservation Act (NHPA) of 1966, as amended, and the Archaeological Resource Protection Act (ARPA) of 1979. Section 106 of the NHPA requires that historic properties, including archeological sites and historic structures that are eligible for or listed in the National Register of Historic Places (NRHP), be taken into consideration during the planning process. The NRHP is the official list of historic properties within the United States that are historically or culturally significant due to their research potential in the areas of history, architecture, or archeology. Impacts to cultural resources are considered during the planning process of the Rio Grande Rectification FCP because changes to the current levee systems may have the potential to affect the historic integrity of a resource which could compromise its eligibility status. In compliance with Section 106 of the NHPA, consideration of cultural resources includes the identification, evaluation, and protection of the resources.

3.3.1 No Action Alternative

Under the No Action Alternative, O&M of the Rectification FCP would not be modified. No adverse affects are anticipated on historical or archaeological resources.

3.3.2 Enhanced Operation and Maintenance Alternative

Proposed improvements to the Rio Grande Rectification FCP under the EOM Alternative may adversely affect known or potential historic resources by physical changes to the levee configuration or floodway modifications. Similarly, under the EOM Alternative may adversely affect known archeological sites and high probability areas (HPA) that may contain historic or prehistoric archeological materials by mechanical excavation or by burial under the expanded levee footprint.

3.3.3 Integrated Water Resources Management Alternative

Potential improvement measures for the Rio Grande Rectification FCP under the IWR Alternative would be similar to those anticipated for the EOM Alternative. Improvement measures for water use and conservation are not likely to increase the potential to adversely affect historical or archeological resources.

3.3.4 Multipurpose Project Management Alternative

Potential improvement measures for the Rio Grande Rectification FCP under the MPM Alternative would include those anticipated for the EOM Alternative. An increased potential to

adversely affect historical or archeological resources could result from actions supported under cooperative agreements.

3.4 LAND USE

This section characterizes land uses in the immediate and general vicinity where project facilities would be located or where those facilities could cause impacts. Impacts to land use would be considered significant if any of the following were to occur: changes in agricultural land use; or changes in recreational use.

3.4.1 No Action Alternative

Under the No Action Alternative, O&M of the Rectification FCP would not change from the current management practices.

3.4.2 Enhanced Operation and Maintenance Alternative

The EOM Alternative includes changes in floodway management that may affect land usage in the immediate project vicinity. Greater restrictions to public use/access of the floodway are anticipated due to increased border patrol operations and designation of restricted use zones.

3.4.3 Integrated Water Resources Management Alternative

The land use impacts for the IWR Alternative would include those described as part of the EOM Alternative. Potential changes in vegetation management would retain current use of natural resources management areas.

3.4.4 Multipurpose Project Management Alternative

The land use impacts of the MPM Alternative would include those described as part of the EOM Alternative. Additional elements of the MPM Alternative have the potential for affecting land use. A key emphasis of the MPM Alternative is multi-jurisdictional, regional, cooperative agreements that promote recreational, water quality, and habitat conservation initiatives. Some of the potential initiatives considered for this region are parks, trails and wildlife habitat preserves. If new land uses such as these are adopted in the region, they may affect adjacent land uses as well. For any proposed park, trail, or habit preserve that receives federal funding, additional regulatory clearance processes will require further examination of the impact to local and regional land uses.

3.5 SOCIOECONOMIC RESOURCES

A socioeconomic impact would be considered significant if the federal action resulted in substantial growth or concentration of population or the need for substantial new housing or public services.

3.5.1 No Action Alternative

Regional Economics

Under the No Action Alternative, O&M of the Rectification FCP would not change from the current management practices. This alternative would not generate additional business sales, income or employment from construction. Current maintenance practices for the Rectification FCP would continue to provide a steady, long-term benefit by continuing to inject revenue in wages and expenditures into the regional economy every year. The Rectification FCP currently employees a permanent staff at the American Dam and in the Fort Hancock Field Office. Assistance from other USIBWC field offices is provided for recurring maintenance operations.

The low-intensity land use in the area and the fact that the majority of the existing channel, floodways, and levees have been constructed on undeveloped and public lands tends to minimize socioeconomic impacts from the continued operation of the Rectification FCP.

Environmental Justice

Executive Order 12898 requires that each federal agency analyze the human health, economic, and social effects of federal actions, including the effects on minority communities and low-income communities. An impact to environmental justice would be considered significant if the federal action had disproportionately high and/or adverse human health or environmental effects on minority and low-income populations.

The affected area is the footprint of land where potential adverse impacts could result from a planned activity. For this project, these are the areas that could be affected by flood waters of the Rio Grande.

Environmental justice impacts can arise as a result of the uncontrolled flood waters that may cause damage to property. The No Action Alternative would result in the continued control of flood waters using current maintenance practices in accordance with applicable regulatory requirements and, therefore, would not result in any increased in flood and associated health hazards to the immediate community.

No adverse impacts to biological resources, geologic resources (*e.g.,* soil), air quality, noise, and cultural resources would occur for the No Action Alternative. For these reasons, there is no potential for disproportionately high and adverse human health and environmental effects on minority and low-income populations.

Transportation

Under the No Action Alternative, O&M of the Rectification FCP would not change from the current management practices. No additional construction equipment or vehicles would be required. None of the proposed improvement projects would occur and the current configuration of the levee system would be retained. Implementation of existing plans to develop parks, nature trails, and recreational areas would likely increase local transportation near the Rio Grande in the El Paso vicinity; however, given the greater restrictions on public use/access to the floodway by increased USBP operations, transportation along the levee roadways is not expected to increase. The No Action Alternative would not adversely affect a roadway's existing LOS. Traffic levels on interstate, state, and local roadways would be

expected to increase due to population growth. This may result in a corresponding increase in traffic congestion and more wear and tear on the roadways

3.5.2 Enhanced Operation and Maintenance Alternative

Regional Economics

The analysis of impacts of EOM activities for the Rectification FCP on socioeconomic resources and environmental justice was based on changes in employment, income, and business volume as indicator criteria, as well as the disproportionate number of minority or low-income populations potentially affected by the proposed levee improvements. Similar levee improvement projects in the Lower Rio Grande Valley are estimated to cost approximately $1,000,000 per mile of construction over a 10-year period, or $100,000 per year. Since these types of projects are similar to the types of projects proposed under the EOM Alternative for the Rectification FCP, this unit cost was used for this analysis. The estimated total cost of all the projects in the Lower Rio Grande Valley is estimated by USIBWC to cost approximately $125 million over the next 10 years, including environmental documentation, geotechnical investigations, design and construction.

On the basis of an estimated cost of $100,000 per mile of construction per year, cost of the EOM Alternative over a 33-mile reach (4 miles in El Paso County and 29 miles in Hudspeth County) of the existing levee would be $3,300,000. This amount represents the direct annual influx of federal funds into El Paso and Hudspeth Counties ($400,000 for El Paso County and $2,900,000 for Hudspeth County). This influx would have a positive local economic impact, representing an increase in direct and indirect sales of $1,355,606 for El Paso County and $9,828,139 for Hudspeth County. Job creation in direct and indirect employment is estimated at 13 for El Paso County and 90 for Hudspeth County. Tables II-3.1 and II-3.2 illustrate the magnitude of the economic influx relative to reference values for both El Paso and Hudspeth Counties.

Table II-3.1 Economic Impacts of EOM Alternative in El Paso County

Evaluation Criteria	Unit Value for Rio Grande Levees [a]	EOM Alternative	Annual Value for El Paso County	Change Relative to El Paso County
Local Expenditures	$ 1,000,000	$ 400,000	Not applicable	
Direct Employment	19	8		
Indirect Employment	12	5		
Total Employment	31	13	272,445 [b]	0.005%
Direct Sales Volume	$ 1,274,065	$ 509,626		
Indirect Sales Volume	$ 2,114,948	$ 845,980		
Total Sales Volume	$ 3,389,013	$ 1,355,606	$ 19,816,513,980 [c]	0.007%
Direct Income	$ 554,814	$ 221,926		
Indirect Income	$ 452,466	$ 180,986		
Total Income	$ 1,007,280	$402,912	$14,155,587,970 [d]	0.003%

[a] Unit data for levee construction from the USIBWC Rio Grande Canalization Project (Parsons 2004).
[b] Total of the labor force (16 years and older) employed in 2005 (Texas Workforce Commission 2007).
[c] Estimated Gross sales for El Paso County in 2005 (Texas Comptroller of Public Accounts 2005).
[d] Based on a 2000 per capita income of $19,617 and an El Paso County population of 721,598.

Table II-3.2 Economic Impacts of EOM Alternative in Hudspeth County

Evaluation Criteria	Unit Value for Rio Grande Levees [a]	EOM Alternative	Annual Value for Hudspeth County	Change Relative to Hudspeth County
Local Expenditures	$ 1,000,000	$ 2,900,000	Not applicable	
Direct Employment	19	55		
Indirect Employment	12	35		
Total Employment	31	90	1,257 [b]	7.2%
Direct Sales Volume	$ 1,274,065	$ 3,694,789		
Indirect Sales Volume	$ 2,114,948	$ 6,133,350		
Total Sales Volume	$ 3,389,013	$ 9,828,139	$ 14,471,860 [c]	68%
Direct Income	$ 554,814	$ 1,608,961		
Indirect Income	$ 452,466	$ 1,312,151		
Total Income	$ 1,007,280	$2,921,112	$32,848,560 [d]	112%

[a] *Unit data for levee construction from the USIBWC Rio Grande Canalization Project (Parsons 2004).*
[b] *Total of the labor force (16 years and older) employed in 2000 (U.S. Census Bureau, 2000).*
[c] *Estimated Gross sales for Hudspeth County in 2005 (Texas Comptroller of Public Accounts 2005).*
[d] *Based on a 2000 per capita income of $9,549 and an Hudspeth County population of 3,440.*

Floodway maintenance is expected to continue under the existing agreement with the U.S. Border Patrol. Small-scale changes are possible in extent or timing of vegetation and sediment removal which would not have an economic impact. The EOM Alternative would not result in significant impacts to regional economics.

Environmental Justice

The EOM Alternative would result in the continuation of floodway maintenance under the existing agreement with the U.S. Border Patrol. Small-scale changes are possible in extent or timing of vegetation removal and sediment removal which would not have any effects on the ability to control floodwaters. Impacts to biological resources, geologic resources (*e.g.*, soil), air quality, noise, and cultural resources would not be expected as a result of the EOM Alternative. For these reasons, disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.

Transportation

Under the EOM Alternative, construction would include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 study conducted by the USACE. Limited improvements would be made in the upper 45-mile reach along river mile 0-2 in El Paso and 15-17 near Sacorro; more extensive improvements would be made in the lower reach at river mile 48-52 (between Chihuahua and Acala), 59-62 (near Fort Hancock), 65-76 (between McNary and Ejida El Cuervo), and 80-91 (between Fort Quitman and the end of the project area). The majority, about 88 percent, of the levee improvement activities would occur within the lower reach between river miles 48-91, approximately 29 miles. All construction activities would occur within the existing USIBWC ROW and government lands. Transportation of construction equipment and the use of personnel vehicles would mainly occur within the levee ROW and along the levee road system within the floodway.

Heavy construction equipment (dump trucks, front-end loaders, graders) would initially be driven to the construction site from larger metropolitan cities like El Paso using the roadways presented in Table II-2.5. Implementation of this alternative would be similar to existing

conditions since USIBWC currently provides similar construction and maintenance projects along the Rio Grande, but on a much smaller scale. During construction, a temporary increase in the use of access roads would take place for placement of equipment in staging areas. Most of the subsequent construction activities, however, would not require public road use as material borrow sites would be located in the vicinity of the construction sites. Following completion of the proposed improvements, the levee road would continue providing service for USIBWC and the USBP activities.

Construction vehicles associated with environmental measures within the floodway (such as erosion protection, sediment management.) would mostly access levee roadways and not the highways listed in Table II-2.5. An increase in transportation on some of the levee roadways from commercial vehicles would likely occur due to primarily disposal of sediment outside the floodway during river channel maintenance. Although an increase in traffic is anticipated, the increase would not be substantial in relation to the existing traffic load and capacity of the roadway system.

This increased traffic would be an inconvenience to commuters traveling on these roadways during the morning commute (the project construction traffic in the evening would occur before the primary evening commute hour). This impact on traffic and circulation on the affected roadways would be temporary and not considered significant, only lasting during the construction period.

3.5.3 Integrated Water Resources Management Alternative

Levee improvement activities involving construction for this alternative would be similar to the EOM Alternative. Therefore, the analysis and conclusions associated with socioeconomic resources and environmental justice from the IWR Alternative would be the same as the EOM Alternative.

The IWR Alternative would result in possible small-scale changes in the timing and/or extent of salt cedar management, increased water supply to the Rio Bosque Wetlands during growing season and modified irrigation drain maintenance,. These changes to ongoing operations and maintenance at the Rio Grande flood control facilities would not be expected to result in any direct or indirect impacts to population, employment, income or housing.

Traffic levels for this alternative would not vary from the EOM Alternative. This alternative would generate the same effects on traffic. The increase in traffic levels would not be substantial in relation to the existing traffic load and capacity of the roadway system.

3.5.4 Multipurpose Project Management Alternative

Levee improvement activities for this alternative involving constrtuction would be similar to the EOM Alternative. Therefore, the analysis and conclusions associated with socioeconomic resources and environmental justice from the MPM Alternative would be the same as the EOM Alternative.

The MPM Alternative would result in possible small-scale changes in the timing and/or extent of control and removal of salt cedar, wildlife habitat conservation outside the ROW, upstream sediment control at dams and traps, flow regime modification to provide year-round

baseflow, and possible restriction of public use/access of the floodway associated with increasing U.S. Border Patrol operations. Changes to offsite wildlife habitat conservation efforts by other agencies or entities may occur as the result of USIBWC participation in multi-agency conservation initiatives. These changes to ongoing operations and maintenance at the Rio Grande flood control facilities would not be expected to result in any direct or indirect impacts to population, employment, income or housing. Additionally, these changes would not be expected to result in any substantial change other than beneficial effects on wildlife and habitat conservation. Impacts to geologic resources (*e.g.*, soil), air quality, noise, and cultural resources would not be expected as a result of the MPM Alternative. For these reasons, disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.

Traffic levels for this alternative would not vary from the EOM and IWR Alternatives. This alternative would generate the same effects on traffic. The increase in traffic levels would not be substantial in relation to the existing traffic load and capacity of the roadway system.

3.6 ENVIRONMENTAL HEALTH

Evaluation criteria considered in air quality analysis include the following.

- Would emissions from the action cause or contribute to a violation of any national, state, or local ambient air quality standard?
- Would emissions from the action represent 10 percent or more of the emissions inventory for the affected AQCR counties, to be considered regionally significant?

The following evaluation criteria were used to determine the impacts of noise:

- The degree to which noise levels generated by demolition and construction activities would be greater than the ambient noise levels;
- The degree to which there would be annoyance, speech interference, and hearing loss; and
- The proximity of noise-sensitive receptors to the noise source.

The evaluation criteria listed below were used to assess the alternatives with regard to hazardous materials and waste.

- Would the action violate federal or state regulations for hazardous waste usage, storage, or disposal?
- Could the action require materials that could not be accommodated by existing guidance?
- Would there be human exposure to hazardous wastes or materials due to the action?
- Would the action cause hazardous waste generation that could not be accommodated by current waste management practices?

3.6.1 No Action Alternative

Under the No Action Alternative, O&M of the Rectification FCP would not change from the current management practices.

Air Quality

Existing air emissions from current practices are established in the emissions inventory for El Paso and Hudspeth Counties. Under the No Action Alternative, none of the proposed improvement projects would occur and the current configuration of the levee system would be retained. Implementation of existing plans to develop parks, nature trails, and recreational areas would likely increase air emissions slightly. However, the No Action Alternative would not contribute to a violation of any national, state, or local ambient air quality standard, and would not raise the emissions for the affected counties beyond 10 percent of the counties' current estimated emissions inventory.

Noise

Under the No Action Alternative, O&M of the Rectification FCP would not change from the current management practices. None of the proposed improvement projects would occur and the current configuration of the levee system would be retained. However, implementation of existing plans to develop parks, nature trails, and recreational areas would likely occur in the El Paso vicinity.

The implementation of existing plans to develop parks, nature trails, and recreational areas would likely increase noise levels, as they would most likely entail the use of construction vehicles and equipment. Current typical outdoor noise sources near the levee system include vehicles, pickup trucks, diesel tractor mowers, and scrapers. Noise sources such as mowers, diesel tractors, and dump trucks at 100 feet produce approximately 70 dBA to 89 dBA of noise (CERL 1978). Noise events associated with current maintenance of the levees, as well as the development of parks, nature trails, and recreational areas would be temporary, occurring only during normal daytime working hours, and would cease when the project is completed.

Sensitive receptors include schools, churches, and medical facilities. Due to the flood-prone nature of land within the levees, no sensitive noise receptors are located immediately adjacent to the levees (*i.e.*, within 100 feet). Therefore, there would be no significant impacts due to noise from current levee maintenance activities.

Public Health and Environmental Hazards

Hazardous material practices of the USIBWC are in compliance with applicable standards under the current operations and maintenance practices. Storage of diesel fuel and refueling of vehicles and equipment is performed in compliance with applicable state and federal standards. No hazardous materials sites are currently affected by operations and maintenance activities. Therefore, current USIBWC practices would not affect hazardous materials handling, nor any facilities or sites in the project area.

The Rectification FCP would continue to implement current maintenance practices such as resurfacing roadways of the levee system and floodway maintenance activities. This alternative would not result in exposure to any contamination on the site, and there are no remediation activities ongoing at the Rectification FCP. For these reasons, impacts to public health and environmental hazards would not occur.

3.6.2 Enhanced Operation and Maintenance Alternative

Air Quality

Under the EOM Alternative, construction would include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 study conducted by the USACE. Limited improvements would be made in the upper 45-mile reach along river miles 0-2 in El Paso and 15-17 near Sacorro; more extensive improvements would be made in the lower reach at river miles 48-52 (between Chihuahua and Acala), 59-62 (near Fort Hancock), 65-76 (between McNary and Ejida El Cuervo), and 80-91 (between Fort Quitman and the end of the project area). Total mileage of improvements for the EOM Alternative is approximately 33 miles. However, the majority of the levee improvement activities would occur within the lower reach between river miles 48-91, approximately 29 miles.

With an average 20-foot top width of the levee, an average levee height of 7.2 feet, and a 3:1 ratio for levee height to length of slope, the current surface width of the levee in the Rectification FCP area is approximately 63 feet. For the purposes of this analysis, a conservative assumption for increase in the levee height is 4 feet for the EOM Alternative. This increase in height would translate to an approximate increase of levee surface width by 24 feet. Assuming a new levee surface width of approximately 87 feet, the total disturbed area of the EOM Alternative improvements would be estimated at 459,360 square feet per mile.

The levee system for the Rectification FCP area transgresses through the southern portions of El Paso and Hudspeth counties, and is located within AQCR 153. AQCR 153 is under attainment status for all criteria pollutants, except for Doña Ana and El Paso Counties (USEPA 2006a). Impacts to air quality in attainment areas would be considered significant if pollutant emissions associated with the implementation of the EOM Alternative caused or contributed to the exceedance of any national, state, or local ambient air quality standard; or represented an increase of 10 percent or more in the affected counties emissions inventory.

Air emissions were calculated for the EOM Alternative based on per mile unit annual emissions estimates, listed in Table II-3.3. Unit air emissions estimates were based on common construction practices and methods (Means 2005) and emission factors reported by USEPA (USEPA 1996). Unit emissions were calculated based an estimated disturbed area per mile, assuming a construction timeframe of 6 months. Unit emissions were then multiplied by the length of the EOM Alternative affected areas, to estimate air emissions for the alternative.

Improvements to the levee through the EOM Alternative would not impact air quality through excavation and fill activities. A slight increase in localized criteria air pollutants would occur due to emissions associated with increasing the existing levee height. Table II-3.3 summarizes the estimated criteria pollutant emissions associated with the EOM Alternative, as well as the percent increase above the existing county emissions inventory. Criteria pollutant increases in El Paso and Hudspeth Counties by levee construction under the EOM Alternative would range from 0.06 to 0.57 percent above the No Action Alternative and would not be regionally significant.

Table II-3.3 Potential Air Emissions of EOM Alternative

	Emissions (tons per year)				
	Sulfur Oxides	**Nitrogen Dioxides**	**Carbon Monoxide**	**Volatile Organic Compounds**	**Particulate Matter (PM_{10})**
Increase levee height, unit emissions (per mile)	0.16	1.27	8.68	0.44	3.27
EOM Alternative in El Paso and Hudspeth Counties (29 miles)	4.64	36.83	251.72	12.76	94.83
El Paso and Hudspeth Counties Emissions Inventory (USEPA 2006)	*2,154*	*28,115*	*165,718*	*22,220*	*16,539*
Emissions as a Percent of County:	0.22%	0.13%	0.15%	0.06%	0.57%

Noise

Under the EOM Alternative, construction would include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 study conducted by the USACE. Limited improvements would be made in the upper 45-mile reach along river mile 0-2 in El Paso and 15-17 near Sacorro; more extensive improvements would be made in the lower reach at river mile 48-52 (between Chihuahua and Acala), 59-62 (near Fort Hancock), 65-76 (between McNary and Ejida El Cuervo), and 80-91 (between Fort Quitman and the end of the project area). The majority, about 88 percent, of the levee improvement activities would occur within the lower reach between river miles 48-91, approximately 29 miles.

Land use in the Rectification FCP area is predominantly agricultural with a limited percentage through urban areas in the upper reach of the levee, or the area associated with El Paso. Due to the flood-prone nature of land within the levees, no sensitive noise receptors are located immediately adjacent to the levees (*i.e.*, within 100 feet). Sensitive receptors would include schools, churches, and medical facilities. Typical outdoor noise sources associated with the EOM Alternative levee improvements would include pickup trucks, diesel dump trucks, diesel tractor bulldozers, rollers, pavers, and scrapers.

For outdoor activities, a DNL of 55 dBA is the sound level below which there is no reason to suspect potential hearing loss from the impacts of noise. A DNL of 75 dBA indicates there is good probability for frequent speech disruption or annoyance. Therefore, a range of 55 dBA to 75 dBA of noise from the EOM Alternative would be considered an impact due to speech disruption or annoyance, and potential hearing loss. Noise sources associated with the EOM Alternative construction activities, such as diesel trucks or scrapers, produce an approximate noise level of 89 dBA at 50 feet (CERL 1978). Noise levels at 100 feet would be reduced, but may still be above 55 dBA.

Hearing loss projections are based on an average daily outdoor exposure of 16 hours over a 40-year period (USEPA 1974). The noise associated with the EOM Alternative would be temporary, occurring only during normal daytime working hours, and would cease when the project is completed. No sensitive receptors or residential areas are located within 100 feet of the proposed construction activities; therefore, it is unlikely that any resident or pedestrian would be exposed to noise levels above 55 dBA. However, should a pedestrian come within 100 feet of construction activities, noise exposure would be temporary and would not cause hearing loss.

Interior noise levels during construction activities would be reduced by approximately 18 to 27 dBA due to the noise level reduction properties of the typical building's construction materials (USDOT 1992). Therefore, any resident living more than 100 feet from construction but close enough to be potentially affected by the noise would have an extra buffer of hearing protection by remaining inside during noise events. Construction workers would be wearing hearing protection during construction activities associated with the EOM Alternative and would not be adversely affected by the high levels of noise.

Elevated noise levels can interfere with speech, causing annoyance or communication difficulties. As indicated above, there is a good probability of speech disruption from construction noise at levels above DNL 75 dBA. Persons conducting conversations within the project area could have their speech disrupted by construction-generated noise. Speech disruption would be temporary, lasting only as long as the noise-producing event. There would be no significant impacts from EOM Alternative noise.

Public Health and Environmental Hazards

Under the EOM Alternative, construction would include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 study conducted by the USACE. Limited improvements would be made in the upper 45-mile reach along river mile 0-2 in El Paso and 15-17 near Sacorro; more extensive improvements would be made in the lower reach at river mile 48-52 (between Chihuahua and Acala), 59-62 (near Fort Hancock), 65-76 (between McNary and Ejida El Cuervo), and 80-91 (between Fort Quitman and the end of the project area). The majority, about 88 percent, of the levee improvement activities would occur within the lower reach between river mile 48-91, approximately 29 miles.

Hazardous and/or toxic products (*e.g.*, fuel, oil, grease, and hydraulic fluid) would be used from operating construction equipment. Implementing established industry practices for controlling releases of these substances would reduce the possibility of accidental releases of these products. Preventive maintenance and daily inspections of the equipment would ensure that any releases of these hazardous materials are minimized. All visible dirt, grime, grease, oil, loose paint, etc., would be removed from the equipment prior to use at the construction sites.

Since the risk of an accidental release of hazardous and/or toxic chemicals or waste is minimal, and implementation of the EOM Alternative would not result in noncompliance with applicable federal or state regulations, it is anticipated that there would be no hazardous and/or toxic waste impacts from the proposed construction activities.

Improvements to the levee system would not be affected by waste storage and disposal sites. Within 1 mile of the levee centerline, 14 toxic release sites, 158 hazardous waste sites, and 6 multi-activity sites were identified in the query, all of which were located within the City of El Paso. None of these sites would affect, or be affected by, the proposed levee construction project.

3.6.3 Integrated Water Resources Management Alternative

Air Quality

This alternative includes the same construction activities as EOM Alternative. Therefore, the analysis and conclusions associated with air emissions from the IWR Alternative would be the same as the EOM Alternative. In addition to these construction activities, the IWR Alternative includes water use and conservation measures such as salt cedar management. Additionally, modified irrigation drain maintenance would be used to improve water quality. These measures would not have an impact on air quality.

Noise

This alternative includes the same construction activities as EOM Alternative. In addition to these construction activities, the IWR Alternative includes water use and conservation measures such as salt cedar management. Additionally, modified irrigation drain maintenance would be used to improve water quality. The IWR Alternative would not produce additional noise sources than those previously analyzed as part of the EOM Alternative construction activities; therefore, the analysis and conclusions associated with the EOM Alternative apply to this alternative.

Public Health and Environmental Hazards

This alternative includes the same construction activities as EOM Alternative. Therefore, the analysis and conclusions associated with hazardous materials and waste sites from the IWR Alternative would be the same as the EOM Alternative. In addition to these construction activities, the IWR Alternative includes water use and conservation measures such as salt cedar management. Modified irrigation drain maintenance would be used to improve water quality. Hazardous materials usage and waste sites would not affect water use and conservation measures.

3.6.4 Multipurpose Project Management Alternative

Air Quality

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives. Therefore, the analysis and conclusions associated with air emissions from the MPM Alternative would be the same as the EOM Alternative. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives. The MPM Alternative would not have an impact on air quality.

Noise

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives. The MPM Alternative would not produce additional noise sources than those previously analyzed as part of the EOM Alternative and IWR Alternative construction activities; therefore, the analysis and conclusions associated with the EOM Alternative apply to this alternative.

Public Health and Environmental Health

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives. Therefore, the analysis and conclusions associated with hazardous materials and waste sites from the MPM Alternative would be the same as the EOM Alternative. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives.

3.7 INDIRECT AND CUMULATIVE IMPACTS

Cumulative impacts considered for the Rectification FCP include support from JTF-6 to the INS strategy for enforcement activities within a 50-mile corridor along the U.S./Mexico border. Actions associated with these enforcement activities would place restrictions to vegetation development in the floodway in additiona to those required for flood control, and place greater restrictions to public use/access of the floodway due to increased USBP operations and designation of restricted use zones.

The enforcement activities would allow INS to gain and maintain control of the southwest border- area for the purpose of enhancing in the prevention, deterrence and detection of illegal activities. JTF-6's support would fall within three major categories: operational (e.g., conduct of ground patrols Listening Post/Observation Post), engineering (e.g., design and construction of training facilities, buildings, border, roads, fences, and lighting), and general (e.g., data analysis and processing, interpretation of aerial photographs). The actions also include the implementation of INS' Integrated Surveillance Intelligence System (ISIS) which includes installation and monitoring remote sensing system such as ground sensors, low level television cameras, and remote video surveillance systems. The activities proposed by INS and the support provided by JTF-6 allow INS to conduct its investigation, apprehension and patrolling activities more efficiently and effectively; thus reducing the flow of illegal drugs into the United States. This program complies with the Immigration and Nationality Act, Illegal Immigration Reform and Immigrant Responsibility Act, other INS regulations as found in Title 8 of the U.S. Code, National Defense Authorization Act and the President's National Drug Control Strategy.

The cumulative effect of INS/JTF-6 actions since the inception of the program (1989) would be approximately 10,600 acres of vegetation being altered. Most of these effects have occurred or would occur within semi-desert grasslands and/or scrublands. Less than 5-acres of wetlands have been disturbed during this period.

Since 1994, no pertinent cultural resources site or structure has incurred significant impacts due to INS or JTF-6 activities. Over 100 new sites potentially eligible for listing on the NRHP have been identified as a result of INS/JTF-6 projects. Due to the policy of avoidance employed by INS and JTF-6, no long-term or cumulative impacts to cultural resources are expected. In the event avoidance is not possible, testing, excavation and mitigation have been employed and coordinated through the appropriate SHPO and/or Native American Nation.

Impacts to air quality, noise, and water supply and quality would be temporary and minor. Since the projects proposed under the USBP initiatives are similar in type, number and magnitude to those projects that have been completed, no long-term or cumulative adverse impacts to these resources are anticipated.

Soil erosion would occur around construction sites. However, implementation of Stormwater Pollution Prevention Plan and best management practices would alleviate the potential of soil erosion. Further, most of the road improvement projects undertaken by INS and JTR-6 are required due to existing soil erosion that has made roads used for patrol impassable. Consequently, such road improvement projects actually decrease soil erosion problems and the indirect effects to aquatic environs through sedimentation.

Direct economic benefits at the local and regional level would produce insignificant and temporary, direct economic benefits. These benefits would be realized through purchase of construction materials, other project-related expenditures, and temporary labor. Long-term indirect socioeconomic benefits would result from the reduction of drug trafficking and the social costs associated with such activities.

DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT IMPROVEMENTS TO USIBWC RIO GRANDE FLOOD CONTROL PROJECTS ALONG THE TEXAS-MEXICO BORDER

CHAPTER III
PRESIDIO-OJINAGA FLOOD CONTROL PROJECT

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SECTION 1
DESCRIPTION OF ALTERNATIVES

This section identifies measures associated with four alternatives for improvement of the flood control projects selected or the PEIS evaluation: a No Action Alternative, the continued implementation of current operation and maintenance (O&M) practices, and three action alternatives: Enhanced Operation and Maintenance (EOM) Alternative, Integrated Water Resources Management (IWR) Alternative; and Multipurpose Project Management (MPM) Alternative. Section 1 also includes an evaluation of actions with potential cumulative effects, and a summary of environmental consequences subsequently evaluated in detail by resource are in Section 3.

1.1 NO ACTION ALTERNATIVE

The Presidio-Ojinaga Flood Control Project (Presidio FCP) was implemented in 1975 to protect productive agricultural lands in the Presidio-Ojinaga Valley from frequent flooding. The project was also intended to establish the international boundary as per the Boundary Treaty of 1970. Figures 4 and 5 included in Chapter 1 show the location of the project and key geographic features.

The Presidio FCP provided flood protection by augmenting the capacity of the river channel through the construction of cleared berms and levees on both sides of the river. The project extends for 13.1 miles through Presidio, Texas. Rectification also took place at the time of project construction, reducing the channel length by about 6.3 miles. Levees on the north and south sides of Cibolo Creek are each 145 feet wide, from the land side ROW limit to the creek side ROW limit. The levees were designed to contain a 25-year flood with 4 feet of freeboard. Downstream of the confluence with the Rio Conchos, the design flow is 42,000 cfs. The levees downstream of the end of the river relocation were raised 4 feet following the September 1978 flood.

There are approximately 15 miles of levee length, including the spur levees. The height of the levees varies from 12 to 35 feet, with the higher at the southern end of the project. The crest width was originally designed to be 16 feet, but is currently between 8 and 12 feet, with the narrower crests at the southern end of the project.

1.1.1 Levee System Maintenance

The USIBWC conducts the following activities for maintenance of floodways of the Presidio FCP, either routinely or on an as-needed basis:

- Grade and resurface maintenance road on levees (annually)
- Mow grass, cut brush/woody vegetation from levee slopes (primarily landside); hand cut vegetation where slopes are too steep (primarily riverside); repair erosion-related damage
- Reinforce levees with rock where needed

Side slopes are mowed continually, and mesquite and salt cedars are removed from the levees. Grading of the levee crest and approach ramps is done as needed. A flex base material is applied to the levee crest and ramps as needed to eliminate rutting. Mowers are used for mowing, a backhoe and dozer are used for grubbing, and a water truck compactor and grader are used for crest grading.

1.1.2 Floodway Maintenance

The USIBWC conducts the following activities for maintenance of the Presidio FCP levee system, either routinely or on an as-needed basis:

- Mow 400 acres of floodway to control weeds and woody vegetation up to twice per growing season
- Maintain no-mow zone/wildlife travel corridor which helps protect levee system
- Remove debris in floodway on regular basis

Minute 247 requires that the area between the boundary line and the levees is to be maintained clear and free of vegetation. For this purpose USIBWC controls vegetation in the levees and floodways, mows 400 acres semi-annually, and removes mesquite and salt cedar. Mowing and grubbing is done year round.

A 25-foot wide, 1-mile long strip of land between the confluence of the Rio Conchos and Cibolo Creek is not mowed or cleared. This strip is located in the floodway, starting about 16 feet from the toe of the levee. The strip has not been mowed since the levee was constructed.

The USBP drags tires both in the floodplain and on the land side of the U.S. levee to track illegal entry. Dragging is done at the toe of the levee. This dragging sometimes appears to cause erosion in the floodplain.

1.1.3 River Channel Maintenance

The USIBWC conducts the following activities for maintenance of the Presidio FCP river channel, either routinely or on an as-needed basis:

- Remove sediment from channel and drains to maintain conveyance capacity and diversion requirements
- Stabilize banks as needed using rocks
- Excavate creek mouths (including Cibolo Creek and Alamito Creek) to maintain channel grade and conveyance

Scrapers and bulldozers are used, as needed, to remove debris and move silt from the river channel to eroded banks. Sediment is disposed on floodways, uplands, and on federal and private land, in accordance with existing agreements. Silt is also removed from the mouth of Cibolo Creek to the extent allowed by the USIBWC jurisdiction only.

1.2 ENHANCED O&M (EOM)

Possible or likely actions for enhanced O&M of the Presidio FCP in terms of flood control and changes in water delivery are discussed below and summarized in Table III-1.1.

Table III-1.1 Potential Improvements to the Presidio FCP

PRESIDIO PROJECT	ALTERNATIVE*			Anticipated Change Relative to the No Action Alternative
	EOM	IWR	MPM	
FLOOD CONTROL AND WATER DELIVERY				
Levee Improvements				
Levee height increase	X	X	X	Improvement projects required as indicated by hydraulic modeling
Structural levee improvements	X	X	X	Improvement projects partially required to implement USACE 2004 recommendations
Changes in Channel Maintenance				
Sediment removal and disposal	X	X	X	Changes possible in extent or disposal location (outside floodway under commercial agreements)
INTEGRATED WATER RESOURCES MANAGEMENT				
Water Use and Conservation				
Salt cedar management		X	X	Changes possible to develop and implement salt cedar management along the channel and arroyos
MULTIPURPOSE PROJECT MANAGEMENT				
Jurisdictional Floodway Use				
Control of invasive/exotic species			X	Implementation possible as part of a regional plan for salt cedar removal
Cooperative Agreements and Regional Initiatives				
Control of invasive/exotic species outside ROW			X	Potential participation in salt cedar removal initiatives identified as a regional priority
Flow regime modification to provide year-round baseflow			X	Potential participation in a viable regional, multiagency initiative

**EOM: Enhanced O&M; IWR: Integrated Water Resources Management; MPM: Multipurpose Project Management*

Improvements to the levee system will entail an increase in height as indicated by the 2003 hydraulic modeling results to meet current flood control criteria. Limited structural improvements are also anticipated. Levee relocation along the Presidio FCP is not anticipated nor considered a desirable/viable option for implementation by the USIBWC.

Changes in *floodway management* are possible for localized projects of streambank stabilization by combined use of mechanical measures and shore vegetation. Currently a 1-mile segment 25-feet wide is maintained from Rio Concho to Cibolo Creek. Greater restrictions on public use/access to the floodway are expected as a result of increased USBP operations (restricted use zones). No changes in timing/extent of mowing and wooded vegetation control other than coordination with other agencies (USBP, USFWS, USACE) are anticipated. Leases for agricultural use are not anticipated and the policy of eliminating grazing leases will be continued.

Changes in *river channel maintenance* would cover primarily sediment disposal outside the floodway through commercial agreements. No changes are expected in the timing or extent of activities for removal of sediment, debris, and shore/aquatic vegetation, currently conducted on an as-needed basis. Changes to water diversion dams or structures, or new construction, are not planned as USIBWC initiatives.

1.3 INTEGRATED WATER RESOURCES MANAGEMENT (IWR)

In addition to those previously discussed for the EOM Alternative, possible or likely future actions for improvements to water resources management are discussed below and summarized in Table III-1.1. The main improvements for *water use and conservation* are development and implementation of control plans for extensive salt cedar formations along the channel and at arroyo mouths. No significant projects, or a potential for implementation, have been identified for revegetation with low-water use species; wetlands improvement; and support of irrigation BMPs to increase water delivery efficiency.

Water quality improvements are primarily limited to continued monitoring as part of the Texas Clean River Program and other water quality programs, as Rio Concho water quality largely determines conditions along the Presidio FCP. Given the short and narrow floodway of the Presidio FCP, minimum benefits are anticipated for additional floodway revegetation to control erosion or use of treatment methods for irrigation return flows.

1.4 MULTIPURPOSE PROJECT MANAGEMENT (MPM)

In addition to those of the IWR Alternative, possible or likely future actions for multipurpose use of the Presidio FCP are discussed below. Table III-1.1 summarizes the multipurpose use of the floodway and cooperative agreements/environmental initiatives.

The potential for *multipurpose use of the jurisdictional floodway* is very limited given the short and narrow floodway availability. Coordination with City of Presidio and/or agencies would be possible for recreational use (trails, seasonal hunting), and salt cedar removal programs, but specific plans are not currently in place. Significant wildlife habitat development in the floodway is not anticipated. Third-party floodway maintenance is not under consideration.

Cooperative Agreements and Environmental Initiatives would extend beyond the USIBWC jurisdiction. Two initiatives, that would be implemented and managed by other agencies or organizations and supported by the USIBWC under cooperative agreements, are:

- Participation in salt cedar removal initiatives identified as a regional priority. This action to be conducted in coordination with the Mexican Government as previously implemented by the U.S. Forest Service at Big Bend National Park.
- Agreements for upstream sediment control at Alamito Creek in support of NRCS/regional initiatives.

Two multipurpose uses of the Presidio FCP are not anticipated, nor considered feasible, for implementation by USIBWC: levee setbacks at flood-prone areas for wildlife habitat expansion, and reconnection of historic, low-elevation meanders.

1.5 OTHER ACTIONS WITH POTENTIAL CUMULATIVE IMPACTS

A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts most likely arise when a relationship exists between a proposed action and other actions that are expected to occur in a similar location or during a similar time period. Actions occurring in the same location or in proximity to each other would be expected to have more potential for cumulative impacts than geographically separated actions. Similarly, actions that coincide, even partially, in time would tend to offer a higher potential for cumulative impacts.

Several actions have been identified by the USBP during the same period as those for the USIBWC. The USBP actions would include the full support from Joint Task Force-Six (JTF-6) to the Immigration and Naturalization Service (INS) strategy for enforcement activities within a 50-mile corridor along the U.S./Mexico border. Findings of the INS evaluation are presented in the 2001 document *Final Report, Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities* (USACE, 2001).

The enforcement activities would allow INS to gain and maintain control of the southwest border- area for the purpose of enhancing in the prevention, deterrence and detection of illegal activities. JTF-6's support would fall within three major categories: operational (e.g., conduct of ground patrols Listening Post/Observation Post), engineering (e.g., design and construction of training facilities, buildings, border, roads, fences, and lighting), and general (e.g., data analysis and processing, interpretation of aerial photographs). The actions also include the implementation of INS' Integrated Surveillance Intelligence System which includes installation and monitoring remote sensing system such as ground sensors, low level television cameras, and remote video surveillance systems. The activities proposed by INS and the support provided by JTF-6 allow INS to conduct its investigation, apprehension and patrolling activities more efficiently and effectively; thus reducing the flow of illegal drugs into the United States.

The Presidio FCP is located within the 50-mile INS enforcement corridor. While INS actions are not part of the alternatives evaluated in this PEIS, they are addressed herein in the context of potential cumulative impacts. Typical INS actions with potential cumulative impacts on the USIBWC flood control project are those associated with floodway use (e.g., vegetation control) and engineering (e.g., road construction and maintenance, and placement of fences and lighting). The analysis of cumulative impacts resulting from incremental effects of the alternatives when added to other past, present, and reasonably foreseeable future actions, is presented in Section 3.7.

1.6 SUMMARY COMPARISON OF POTENTIAL ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

A summary of potential consequences is presented in Table III-1.2.

1 **Table III-1.2 Summary of Environmental Consequences of Alternatives for Improvement of the Presidio FCP**

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Water Resources				
	Without levee system improvements, current containment capacity may be insufficient to fully control severe flooding.	Improvements to the levee system would increase flood containment capacity to control severe floods.	Implementation of water use and conservation measures (*e.g.* salt cedar management) would improve water resource utilization.	Initiatives that increase floodway vegetation would moderately increase water consumption, but would be offset by improved water resource use.
Biological Resources				
Vegetation	The levee slopes would continue to be mowed on an as-needed basis, and the U.S. Border Patrol would remove vegetation for operations. The vegetation on levee slopes would remain as non-native species.	Levee system improvements would remove vegetation on the levee slopes and t the toe of the levee. Non-native grasses would rapidly re-establish after construction was complete.	Will include same effects as under EOM Alternative. Salt cedar management would remove salt cedar, but it is expected to rapidly re-establish unless native species are planted. Native plant species would not be expected to increase.	Will include same effects presented under the EOM and IWR Alternatives. Development of parks and hike and bike trails would remove vegetation in limited areas. Habitat revegetation and conservation along limited reaches of the levee corridor and outside the USIBWC corridor would provide additional habitat for native plant species.
Wildlife	The on-going mowing of the levee slopes and removal of vegetation would maintain this habitat as relatively low-quality for wildlife use.	Removal of non-native grasses on the levee sidewalls and within the expanded footprint would not affect wildlife, and the levee slopes would remain as relatively low-quality habitat for wildlife.	Salt cedar management projects would remove salt cedar, but salt cedar would be rapidly re-established, and it would remain as relatively low-quality habitat.	Regional cooperative wildlife conservation, in combination with regional vegetation management would provide additional breeding and foraging habitat for wildlife species, particularly birds.

	No Action Alternative	**Enhanced Operation and Management (EOM) Alternative**	**Integrated Water Resources Management (IWR) Alternative**	**Multipurpose Project Management (MPM) Alternative**
Threatened and Endangered Species	The on-going mowing of the levee slopes and removal of vegetation would maintain this habitat as relatively low-quality for wildlife use. The T&E species present in the region would not be affected by the action.	Removal of non-native vegetation along levee slopes would maintain the relatively low-quality habitat.	Salt cedar management would remove salt cedar, but salt cedar would rapidly re-establish and habitat would not be improved for T&E species.	Regional initiatives that preserve and improve foraging and breeding habitat would improve habitat for T&E species.
Aquatic Ecosystems	Ongoing removal of invasive aquatic plants and sediment would temporarily improve aquatic habitats by improving flow regimes.	Removal of invasive aquatic plants would occur on an as-needed basis, with the sme effects at the No Action Alternative.	The effects would be similar to those of the No Action Alternative.	Regional cooperative initiatives to improve aquatic habitat include increasing backwaters at the mouth of arroyos, and watershed management to improve sediment control would improve habitat for fish and other aquatic species.
Unique or Sensitive areas	There are no unique or sensitive areas within the project area. Mowing the levee and vegetation removal would not affect unique or sensitive areas.	No changes from the No Action Alternative would occur.	No changes from the No Action Alternative would occur.	The actions under the MPM Alternative would not affect any presently unidentified unique or sensitive areas.
Wetlands	Mowing the levee and vegetation removal for would not affect wetlands.	Levee footprint expansion may affect wetlands, but effects would be minimized to extent possible.	No actions to improve wetlands would occur under the IWR Alternative	No actions to improve wetlands would occur under the MPM Alternative.
Land Use				
Residential Uses	Existing residential communities near the river corridor would not be affected.	Floodway management changes would not affect residential uses..	Land use impacts would include those impacts described under the EOM Alternative.	Upstream sediment controls to remediate a large sediment load from Alamito Creek may require additional improvements. If dams, traps or other improvements are offsite they may affect adjacent land uses as well.

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Agricultural Uses	Existing agriculture is primarily rangeland, which would not be affected.	Floodway management changes would not affect agricultural or rangeland uses within the immediate vicinity.	Land use impacts would include those impacts described under the EOM Alternative.	Upstream sediment controls to remediate a large sediment load from Alamito Creek may require additional improvements. If dams, traps or other improvements are offsite they may affect adjacent land uses as well.
Recreational Uses	No recreational uses are located in the general area. .	No recreational uses are located in the general area.	No recreational uses are located in the general area.	No recreational uses are located in the general area.
Other Uses	No industrial or manufacturing uses located in the general area.	No industrial or manufacturing uses located in the general area.	No industrial or manufacturing uses located in the general area.	No industrial or manufacturing uses located in the general area.
Cultural Resources				
Historical Resources	The levee would not be raised or altered. There would be no adverse effects on the16 historic structures in the project area.	Historic structures may be affected by physical changes in the levee configuration or increased levee height.	Historic structures may be affected by physical changes in the levee configuration or increased levee height. Historic resources may be affected by changes in floodway management.	Historic structures may be affected by physical changes in the levee configuration or increased levee height. Historic resources may also be affected by changes in floodway and channel maintenance, and upstream channel control.
Archeological Resources	The levee would not be raised or altered. There would be no adverse effects on the 31 archeological sites.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height. Historic resources may also be affected by changes in floodway and channel maintenance, and upstream channel control.
Indian Trust Lands	Indian Trust lands have not been identified within the corridor.	Indian Trust lands have not been identified within the corridor.	Indian Trust lands have not been identified within the corridor.	Indian Trust lands have not been identified within the corridor.
Socioeconomic Resources				

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Regional Economics	Additional business sales, income or employment from construction would not be generated. Current maintenance practices would continue to inject revenue in wages and expenditures in the regional economy every year.	Levee improvements would generate additional short-term jobs and increased sales volumes for the Presidio County that would last the duration of the project, but would not significantly impact regional economics.	Impacts on regional economics would be the same as the EOM Alternative.	Impacts on regional economics would be the same as the EOM Alternative.
Environmental Justice	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.
Transportation	The transportation system would continue to provide access to residents and the Level of Service would not be altered.	The roadways existing level of service (LOS) would not be increased under the EOM Alternative, but use of access road use would increase to place equipment in staging areas. Heavy construction equipment would be mobilized from larger metropolitan areas.	Traffic levels under the IWR Alternative would not vary from the traffic of the EOM Alternative, and LOS on affected roadways would not change.	Traffic levels under the MPM Alternative would not vary from the traffic of the EOM Alternative, and LOS on affected roadways would not change.
Environmental Health				
Air Quality	Emissions generating activities would be the same as the current ongoing activities.	Regional air quality would not be affected. A slight increase in localized criteria air pollutants would occur during construction activities. Emissions would be temporary and eliminated after completion of construction activities.	Additional activities proposed under the IWR Alternative would not impact regional air quality.	Additional activities proposed under the MPM Alternative would not impact regional air quality.

	No Action Alternative	**Enhanced Operation and Management (EOM) Alternative**	**Integrated Water Resources Management (IWR) Alternative**	**Multipurpose Project Management (MPM) Alternative**
Noise	Due to the flood-prone nature of land within the levees, no sensitive noise receptors are located immediately adjacent to the levees. Therefore, there would be no significant impacts due to noise from current levee maintenance activities	Similar to the No Action Alternative. Noise from additional construction activities would be intermittent and short-term in duration.	The IWR Alternative would not produce additional noise sources than construction activities, and therefore, the IWR Alternative would not impact noise values.	The MPM Alternative would not produce additional noise sources than construction activities, and therefore, the IWR Alternative would not impact noise values.
Public Health and Environmental Hazards	Current maintenance practices such as resurfacing roadways of the levee system and floodway maintenance activities would continue. Exposure to any contamination on the site would not occur, and there are no ongoing remediation activities along or adjacent to the levee system. Impacts to public health and environmental hazards would not occur.	Hazardous materials (*e.g.*, fuel oil, grease, hydraulic fluid) would be used from operating construction equipment. Established industry practices for controlling releases of these products would be used. There are no on-going remediation activities or hazardous waste sites along or adjacent to the levee system. Impacts to public health and environmental hazards would not occur.	Similar to the EOM Alternative. Impacts to public health and environmental hazards would not occur.	Similar to the EOM Alternative. Impacts to public health and environmental hazards would not occur.

SECTION 2
AFFECTED ENVIRONMENT

This section describes resources in the potential area of influence of the Presidio FCP. Environmental conditions along the potential area of influence of the Presidio FCP have been described in detail in the following two documents which are incorporated herein by reference, as allowed by 40 CFR 1508.02:

- *Environmental Baseline, Texas Land Border, Volume Two* (USACE 1994).
- *Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities* (USACE 2001).

The data presented in these documents are on a county-level basis and by physiographic province. These discussions are paraphrases of the detailed descriptions provide in the documents mentioned above. They are presented herein merely to acquaint the reader with the project area. If additional information is necessary, the reader should refer to the environmental baseline documents. Current conditions are discussed in Sections 2 and 3 as follows:

- Water resources;
- Biological resources;
- Cultural resources;
- Land use;
- Socioeconomics resources and transportation; and
- Environmental health.

2.1 WATER RESOURCES

2.1.1 Flood Control

The Presidio FCP presents a predominantly steep topography in the downstream reach of the project, but its shorter extent and narrow floodway offers a low potential for additional flood control.

The Presidio FCP provided flood protection by augmenting the capacity of the river channel through the construction of cleared berms and levees on both sides of the river. The project extends for 13.1 miles through Presidio, Texas. Rectification also took place at the time of project construction, reducing the channel length by about 6.3 miles. Levees on the north and south sides of Cibolo Creek are each 145 feet wide, from the land side ROW limit to the creek side ROW limit. The levees were designed to contain a 25-year flood with 4 feet of freeboard. Downstream of the confluence with the Rio Conchos, the design flow is 42,000 cfs. The levees downstream of the end of the river relocation were raised 4 feet following the September 1978 flood.

There are approximately 15 miles of levee length, including the spur levees. The height of the levees varies from 12 to 35 feet, with the higher at the southern end of the project. The crest width was originally designed to be 16 feet, but is currently between 8 and 12 feet, with the narrower crests at the southern end of the project.

2.1.2 Hydrology

The Presidio FCP has low upstream flow contributions, but baseline flow becomes more stable downstream from a major Mexico tributary stream, the Rio Conchos.

2.1.3 Water Supply and Water Management

The Presidio FCP has low upstream flow contributions, but baseline flow becomes more stable downstream from a major Mexico tributary stream, the Rio Conchos.

Surface water in the Texas Basin and Range Province is located in the Rio Grande basin, which includes the Presidio FCP area. San Estaban Lake is the area's largest lacustrine body of water with a surface area of 762 acres providing water conservation storage (18,700 acre-feet) and flood control in Presidio County. The lake is located south of Marfa and east of U.S. Highway 67 (USACE 2001).

2.1.4 Groundwater Resources

The main aquifer in the project area is the Alluvium and Bolson Deposits which is located in many isolated areas. It is an important source for irrigation and public water supply. This unconfined system consists of sand, gravel, silt, and clay and ranges in depth from 100 to 1,000 feet but may extend to depths of more than 3,000 feet. Groundwater is the primary source of drinking water in the project area. Groundwater assessments within the project area aquifer indicate that the most common sources for potential contamination include the following: 1) increased chloride/sulfate concentrations along the Rio Grande that exceed Secondary Drinking Water Standards; 2) higher levels of total dissolved solids with levels exceeding 3,000–10,000 mg/L; 3) natural/man-made low levels of nitrate (0-20 percent), Presidio and Hudspeth (41-60 percent); and fluoride (0-3 percent) that continually exceed the Federal drinking water standards (USACE 2001).

The western part of Presidio County contains the southernmost aquifer of the Rio Grande aquifer system, which is called the Presidio Basin. The Rio Grande forms the western boundary for the basin; it is bounded on the east by mountains. The width of the basin ranges from 4 to 10 miles, and the length is about 70 miles. The basin contains thicknesses of fine-grained alluvial deposits, volcanic rocks, and volcanic/clastic deposits. The basin-fill deposits are as much as 5,000 feet thick along the axis of the basin near the Rio Grande (U.S. Geological Survey [USGS] 1996).

Groundwater has been developed along the flood plain of the Rio Grande, where it is used mostly for irrigation; in other parts of the basin, groundwater is pumped only for livestock

watering and domestic use. Large-diameter irrigation wells in the flood plain of the Rio Grande at the southern end of the basin yield from 300 to 800 gallons per minute. Specific-capacity data indicate a transmissivity of about 5,000 to 21,000 feet squared per day for the alluvial aquifer in the Rio Grande Valley. Recharge to the basin fill is mainly along the bordering mountains where small streams enter the basin. Groundwater flows from the basin margins to the Rio Grande, where it is discharged either by evapotranspiration or by seepage to the river (USGS 1996).

In the Rio Grande Valley in the central part of the basin, an estimated 5 million gallons per day of groundwater was withdrawn for irrigation during 1960. An estimated 800,000 acre-feet of freshwater is in storage in the Presidio Basin alluvial aquifer; of this amount, an estimated 75 percent can be recovered (USGS 1996).

2.1.5 Agricultural Water Use

The Presidio FCP was implemented in 1975 to protect productive agricultural lands in the Presidio-Ojinaga Valley from frequent flooding. The project was also intended to establish the international boundary as per the Boundary Treaty of 1970.

2.1.6 Water Quality

The Presidio FCP is located within water quality management Segments 2306 and 2307 of the Rio Grande, as defined by the Texas Commission on Environmental Quality. Segment 2307 extends from the Riverside Diversion Dam in El Paso County to the confluence of the Rio Conchos in Presidio County, while Segment 2306 extends from the confluence of the Rio Conchos to the International Amistad Reservoir. The designated uses of the two segments are high aquatic life, contact recreation, fish consumption, and public water supply. Water quality information below the confluence of the Rio Conchos but upstream of Presidio shows that chloride, sulfate, fecal coliform, and total dissolved solids exceed surface water quality and drinking water supply standards. Furthermore, monitoring information shows that fecal coliform concentrations increase as the river flows though the Presidio-Ojinaga urban area (Parsons 2006a).

2.2 BIOLOGICAL RESOURCES

Biological resources have been described in *Biological Resources Survey, Rio Grande and Tijuana River Flood Control Projects, Mew Mexico, Texas and California, Final Report* (CDM 2005); and *Environmental Baseline, Texas Land Border, Volume Two* (USACE 1994). Information from these documents is incorporated by reference. The Presidio FCP is located Presidio County, Texas.

2.2.1 Vegetation

The Presidio FCP area is within the northern Tans-Pecos region of the Chihuahuan Desert. This region includes all sections of the Chihuahuan Desert in the U.S. and the northernmost

sections of the desert of Mexico (MacMahon 1988). Climatic conditions throughout the study area is classified as semi-arid continental, characterized by fairly hot summers, mild winters, and short temperate spring and fall seasons. Precipitation averages 7.7 inches per year (Parsons 2001).

The Trans-Pecos region of the Chihuahuan Desert is historically a mosaic of grasslands and desert shrublands (MacMahon 1988; McClaran 1995). The grassland areas are dominated by tobosa, black grama, and other grass species. The dominant desert shrub species are either creosote bush or tarbush or a mixture of the two. Other shrub species and succulents are also present in this area. In areas where washes or rivers are present, riparian vegetation is dominated by willows, cottonwood, and mesquite. Other species such as ash and desert willow may also be present. In the recent past, riparian aras have been degraded, and the invasive salt cedar has attained dominance in many locations.

Along the riparian areas of the Rio Grande, plant communities were historically classified as bosque or deciduous forest, and included cottonwood, willows, Berlandier ash, netleaf hackberry, and little walnut (Crawford, *et al*. 1996).

As a result of clearing native vegetation for rangeland development (for the production of cattle and goats) and in limited areas, for agricultural development (for production of food crops), relatively small areas of native vegetation remain. Further, extensive salt cedar invasion has occurred, reducing native habitat.

The levees that were installed to provide flood protection are raised trapezoidal compacted-earth structures, with a crown width of 8 to 12 feet, with the narrower crown at the southern end of the project. The levee height varies between 12 and 35 feet, with the higher at the southern end of the project, and side slopes of 2-1/2:1. The levee slopes are grass covered, and are dominated by dropseed. The levee slopes are frequently mowed to prevent the encroachment of woody plants onto the levee slopes.

2.2.2 Wildlife

A number of wildlife species are present in the region. The Rio Grande is a major migratory flyway for numerous bird species, particularly waterfowl, shore birds, and those associated with riparian habitats. The cleared floodplain also provides suitable hunting areas for raptors. Of the variety of birds found in the area, some common species include the great blue heron, red-winged blackbird, western kingbird, burrowing owl, gadwall, mourning dove, scaled quail and turkey vulture. Terrestrial game animals are sparse due to intensive land use and insufficient food and cover at many locations. The mule deer is the only large game animal known to occur in the region. Other non-game mammals include the coyote, bobcat, spotted skunk, striped skunk, desert cottontail, black-tailed jackrabbit, porcupine, gopher, several species of bats, and several species of rats and mice. Furbearing mammals include the mountain lion, bobcat, kit fox, gray fox, long-tailed weasel, raccoon, ringtail, badger, beaver, nutria, and muskrat. As in the case of mammals, a small number of reptile and amphibian species are expected in the study area, due to intensive land use and insufficient food and cover at many locations (Parsons, 2001; TPWD, 2007).

2.2.3 Threatened and Endangered Species

Within the Presidio FCP area, there are several species listed as federally threatened or endangered, and several additional species which are listed as threatened or endangered by the State of Texas (TPWD, 2006). The project area is within Presidio County and there are several federal and state listed T&E species, as follows:

- 11 species of birds;
- 6 species of fish (two of which are probably extirpated);
- 4 species of mammals (two of which are probably extirpated);
- 5 species of reptiles, and;
- 1 species of plant.

See Appendix B for additional details about the T&E species within these counties.

2.2.4 Aquatic Ecosystems

The aquatic ecosystems are restricted to the Rio Grande and the tributaries that flow into the Rio Grande. In this region, the fish fauna are likely to be primarily minnows in the tributaries all or part of their life cycles. In the Rio Grande, the dominant fish species include gizzard shad, red shiner, common carp, river carpsucker, channel catfish, western mosquitofish, and green sunfish (TPWD 1998).

2.2.5 Unique or Sensitive Areas

There are no areas within the Presidio FCP area that have been classified as unique or sensitive areas, including lands owned and managed by the USFWS or the TPWD.

2.2.6 Wetlands

Wetlands have been identified as being of particular concern because they perform valuable functions in restoring and maintaining the quality of the nation's waters. These functions include flood water storage, sediment trapping, nutrient removal, chemical detoxification, shoreline stabilization, aquatic food chain support, fish and wildlife habitat, and groundwater recharge. In Texas, wetlands are among the most valuable resources. Additionally, these communities provide many economic and ecological benefits, hunting, fishing, and bird watching opportunities (TPWD 1997). Although wetlands comprise less than five percent of its total land area, Texas has the fourth greatest wetland acreage in the lower forty-eight states following Florida, Louisiana, and Minnesota (Dahl 1990).

Diverse wetland types provide habitat for many plant and animal species. Most freshwater fish depend on wetlands for food, spawning, and nursery grounds (Tiner 1984). Texas wetland

ecosystems are extremely important to wildlife since the state is one of the most important wintering areas for waterfowl in North America (Stutzenbaker and Weller 1989). Waterfowl utilize wetland plants and animals for food while over-wintering or during migration stopovers. Wetlands are also important breeding areas, and they provide cover for nesting waterfowl and other birds (TPWD 1997).

The USFWS has estimated that from the 1780s to the 1980s, wetland acreage in Texas decreased by 52 percent from about 16 million to about 7.6 million acres (Dahl 1990). Wetlands of every type have been affected. Some of these losses can be attributed to natural causes, but large percentages of the losses were caused by human activities. In rural areas, losses can be attributed to conversion to cropland, declining water levels due to pumping for irrigation, and overgrazing of wetland vegetation by livestock, which can increase erosion and evaporation. In urban areas, wetland losses occur due to encroachment by residential and commercial construction and industrial development. Other activities that can cause wetland losses are filling, water diversion, drainage and river channelization, clear-cutting, burning, lowering or disturbing the shallow water table, and the construction of dams, reservoirs, flood-control ditches, levees, irrigation canals, and barge and ship canals. Wetland degradation also has resulted from the discharge of inadequately treated sewage and industrial waste into wetlands (TPWD 1997).

Some land use practices have led to the creation of new wetlands or the enlargement of existing wetlands, for example the Rio Bosque near the City of El Paso. However, those gains have not offset the state-wide losses of natural wetland acreage, function, and value that have occurred.

The wetlands once present along the Rio Grande have been altered due to water control projects and the clearing of native vegetation. Although the wetlands in the Rio Grande Valley have been altered, various sizes and types of wetlands exist throughout the project area. Wetlands in the project area can be classified into three separate systems: lacustrine, palustrine, and riverine, as described below. In addition to these wetlands, there are other man-made waters such as settling basins, ditches, canals, reservoirs, and man-made lakes throughout the project area. These man-made waters are primarily designed for flood control and irrigation purposes; however, these structures are often lined with dense vegetation that supports wildlife and serve as travel corridors for many species.

Lacustrine systems are composed of deepwater habitats and associated wetlands situated in topographic depressions or dammed river channels. Lacustrine wetlands are common in the project area and are associated with the open water of resacas, ponds, lakes, reservoirs, and settling basins. Resacas are old, abandoned river channels that measure from one to six feet deep and 30 to 150 ft wide. Resacas may hold water forming an oxbow lake or only hold water for part of the year. Cattails and willows often dominate the resacas. Resacas provide water for irrigation and support numerous wildlife species. The wildlife and human uses of resacas are dependent on the water quality and the permanency of the water. Very little is known about the water quality of resacas, but some may have decreased water quality due to agricultural runoff and release of sewage during flood events. Siltation has become a major problem within

resacas due to the absence of scouring and the increase in urban runoff, shoreline erosion, and general degradation of water quality (Ramirez 1986).

Palustrine systems are all nontidal wetlands dominated by trees, shrubs, and other vegetation. Palustrine systems are very limited within the project area. Palustrine systems are often found around resacas and riparian habitat along the Rio Grande (Moulton *et al.* 1997).

Riverine systems are all wetlands and deepwater habitats within a river channel. The Rio Grande is the dominant riverine system in the project area. Small riverine systems associated with canals and ditches also exist in the project area.

2.3 CULTURAL RESOURCES

Cultural resources in the Presidio-Ojinaga Flood Control Project are defined as historic properties that are archeological sites or historic structures. In several cases, archeological sites also contain historic structures. Archeological sites in the project area range in date from the Formative (Late Prehistoric) to the historic period (A.D. 900 to 1535) (GMI 2005). Historic structures are defined as those that were constructed 50 or more years ago. For these cultural resource types, the project area encompasses all areas that could be directly affected by the project or areas where a change may result in indirect effects to cultural resources.

2.3.1 Historical Resources

Within the Presidio FCP area, there are 16 cultural resources containing historic structures. All of the cultural resources containing standing structures are within known archeological sites (Parsons 2004).

2.3.2 Archeological Resources

A thorough description of the environmental setting and cultural overview has been provided in previous documentation by GMI (2005) and Parsons (2004). Within the Presidio FCP area, 31 archeological sites have been identified. Eight sites were prehistoric, 12 sites were historic (included historic archeological sites and standing structures; some archeological sites also contain standing structures), three sites are multicomponent, and eight sites have an unknown temporal component (Parsons 2004).

The literature search performed during this study identified 31 previously recorded archeological sites between the Rio Grande and the valley wall along the length of the project corridor (Parsons 2004). Of those identified, eight sites were prehistoric, 12 sites were historic (included historic archeological sites and standing structures; some archeological sites also contain standing structures), three sites are multicomponent (prehistoric and historic), and eight sites have an unknown temporal component (Parsons 2004). During the reconnaissance survey performed for the Parsons study, eleven high-probability areas for unrecorded cultural resources were identified (Parsons 2004).

2.4 LAND USE

This section characterizes land uses in the immediate and general vicinity where project facilities would be located or where those facilities could cause impacts. This section includes a description of the existing public and private land uses in this portion of the Rio Grande valley of the United States, as well as a general discussion of land uses adjacent to the project area in Mexico.

2.4.1 Urban Development

Much of the immediate project vicinity is undeveloped rural land and range land for cattle (FWT-WPG 2006). Moving east along the corridor from the project start point, there is no significant development for approximately five miles. Scattered industrial, commercial, and residential uses begin on the western edge of Presidio, as well as irrigation facilities. These are located approximately three miles west of Presidio, adjacent to the Rodriguez Arroyo (Google Earth 2006-2007).

The urbanized area of Presidio is located in the immediate project vicinity for the remainder of the project corridor. This small city had a population of 4,167 at the 2000 U.S. Census. Several different types of land uses are located within the immediate project vicinity, including residential, commercial, industrial, and vacant (Google Earth 2006-2007).

As stated above, the city of Presidio had a population of 4,167 at the 2000 U.S. Census, and the majority of these residents are located within the Immediate Project Vicinity. Based on aerial photography, it appears that nearly all the remaining residences are located within the General Project Vicinity (Google Earth 2006-2007).

There are no significant areas of residential population beyond the Presidio urban area. The next populated area along the project corridor is the town of Redford (population 132, per the 2000 U.S. Census), more than eight miles east of the project limits on the U.S.- Mexico border. The Chihuahuan Desert to the north has prevented much settlement; the small town of Shafter is located about twenty miles north of Presidio on US 67, but is little more than a tourist stop at a ghost town destination (Presidio Chamber of Commerce 2007)

2.4.2 Agricultural Use

The general project vicinity follows a land use pattern similar to the character of the immediate project vicinity. Except for the developed area of the city of Presidio, the corridor contains some agricultural uses, including range land and farming, and vacant, undeveloped areas (Google Earth 2006-2007).

Agricultural land use in Presidio County consists primarily of rangeland, which varies in quality from good to poor, depending upon rainfall, soil conditions, and past history of overgrazing. Irrigated farm land in Presidio County is generally found in the Rio Grande Valley between Candelaria and Redford, but occasionally cropland is removed from production due to drought conditions (FWT-WPG 2006). Recent conditions above the City of Presidio on

the Rio Grande triggered such measures. Dominant farm crops are cantaloupe and onions, and crops which have been grown in the past include wheat, oats, barley and sorghum. Most of the income in the county comes from cattle, goat ranching and alfalfa (Presidio Chamber of Commerce 2007)

2.4.3 Recreational Use

No significant recreational uses are located in the general project vicinity.

2.4.4 Planned Land Uses in the Project Area

In March 2004, a Presidio County Forum was conducted in Marfa, Texas as part of the Presidio County Futures Forum series. The Futures Forums were coordinated by the Presidio County Extension Office, of the Texas A&M University System. Some of the priorities identified at the March 2004 meeting that may affect land use in the general project vicinity included (Presidio County Cooperative Extension 2004):

- Irrigation in Presidio Valley
- Agricultural Land Transition
- Improved Community Infrastructure
- Water System
- Sewer System
- Streets
- Buildings
- Parks/Recreation

2.5 SOCIOECONOMIC RESOURCES AND TRANSPORTATION

Socioeconomics is defined as the basic attributes and resources associated with the human environment. Depending on local economic and demographic characteristics, the proposed action at the Presidio FCP could potentially influence socioeconomic activity within the surrounding region of influence. Impacts on these fundamental socioeconomic components can also influence other issues such as housing availability.

The socioeconomic region of influence for the proposed project include Presidio County, with particular emphasis on the city of Presidio. Socioeconomic characteristics described for the region of influence would not vary between site alternatives for the Presidio FCP; therefore, the following discussion is applicable to all of the alternatives.

2.5.1 Regional Economics

For the purposes of this PEIS, regional economics includes population, employment/income, and housing.

Population

The Presidio FCP is located within Presidio County. The levee system for the Presidio FCP extends approximately 15 miles in length and is located along the Rio Grande between the sister cities of Presidio, Texas and Ojinaga, Chihuahua, Mexico. The area along the Rio Grande in Presidio County is entirely rural.

Table III-2 1 presents population characteristics, including populations in 2000, as well as projected populations for 2005, 2020, and 2030. As shown in Table Table III-2.1, the total county population for Presidio County is projected to increase 150 percent.

Table III-2.1
Population Growth in Presidio County Adjacent to the Presidio FCP

Jurisdiction	2000	2005	2020	2030	Percent Change 2000-2030
Presidio County	7,304[1]	7,722[1]	15,008[2]	18,268[2]	150%

[1]U.S. Census Bureau, 2007
[2] TWDB 2002

Employment and Income

The economy of Presidio County is based on agriculture, public administration, social services, and retail sales sectors of the economy (Texas Workforce Commission 2007). The estimated total employment for Presidio County is shown in Table III-2.2. The estimated total employment for the county increased 5.5 percent from 2000 to 2005.

Table III-2.2
Estimated Total Employment for Presidio County Adjacent to the Presidio FCP

	2000	2005	Percent Change 2000-2005
Presidio County	2,517[1]	2,657[1]	5.5%

[1] U.S. Census Bureau, 2007

Median household incomes for Presidio County (reported in 1999 dollars) was $19,860, whereas the median family income was $22,314. Per capita income was $9,958 (U.S. Census Bureau 2007).

Approximately 36.4 percent in Presidio County were reported to be below the poverty level in the 2000 Census (U.S. Census Bureau 2007).

Housing

According to the 2000 U.S. Census, the housing stock in Presidio County was 3,299. The number of housing units for 2005 was 3,702, or an increase of 12.2 percent from 2000.

Table III-2.3
Estimated Total Housing Units for Presidio County Adjacent to the Presidio FCP

	2000	2005	Percent Change 2000-2005
Presidio County	3,299[1]	3,702	12.2

[1] U.S. Census Bureau, 2007

Agricultural Economics

The Presidio FCP was implemented in 1975 to protect productive agricultural lands in the Presidio-Ojinaga Valley from frequent flooding as well as to establish the international boundary as per the Boundary Treaty of 1970. Much of the immediate project vicinity is undeveloped rural land and range land for cattle (FWT-WPG 2006: 1-25). Except for the developed area of the city of Presidio, the corridor contains some agricultural uses, including range land and farming, and vacant, undeveloped areas (Google Earth 2006-2007).

2.5.2 Environmental Justice

Executive Order (E.O.) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, encourages federal facilities to achieve "environmental justice" by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Accompanying E.O. 12898 was a Presidential transmittal memorandum, which referenced existing federal statutes and regulations to be used in conjunction with E.O. 12898. One of the items in this memorandum was the use of the policies and procedures of NEPA, specifically that, "Each Federal agency shall analyze the environmental effects, including human health, economic, and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 USC Section 4321, et seq." In this subchapter, relevant data regarding environmental justice is presented, along with an analysis of census tracts that would be affected by flood control management alternatives being considered by the USIBWC for the Presidio FCP in Presidio County, Texas.

Demographic Data

An analysis of demographic data was conducted to derive information on the approximate locations of low-income and minority populations in the community of concern. In developing statistics for the 2000 Census of Population and Housing, the U.S. Department of Commerce, Bureau of the Census, identified small subdivisions used to group statistical census data. In metropolitan areas, these subdivisions are known as census tracts.

Since the analysis considers disproportionate impacts, two areas must be defined to facilitate comparison between the area actually affected and a larger regional area that serves as a basis for comparison and includes the area actually affected. The larger regional area is defined as the smallest political unit that includes the affected area and is called the community of comparison.

Minority Populations

The percentage of the population represented by minorities and the poverty rate for each of the selected census tracts in the project area are shown on Table 4.5-4. The minority population in Presidio County is 84.8 percent. Minority populations of Hispanic nationality dominate in the potential region of influence.

Table III-2.4 Percentage of Minority Populations and Poverty Rates in the Project Area

	Presidio	Percent
White	6,205	85.0
Hispanic or Latino (of any race)	6,162	84.4
Black	20	0.3
Asian	6	0.1
American Indian	1	0
Poverty (individuals)	2,617	38.4
Total Minority		84.8

Source: U.S. Census Bureau 2007

2.5.3 Transportation

The levee system for the Presidio FCP extends approximately 15 miles in length and is located along the Rio Grande between the sister cities of Presidio, Texas and Ojinaga, Chihuahua, Mexico. The levee system transgresses through the southern portions of Presidio County. Presidio has numerous agricultural areas adjacent to the Rio Grande, which are

accessed by unimproved county and local roadways. There are no FM roadways in the Presidio area. In addition, a large system of dirt roads and jeep trails in various conditions occur along the border area.

The major artery for highway traffic is Interstate Highway (IH) 67, which connects Presidio to Marfa, which is to the north. Also important is State Highway (SH) 170, which traverses through the county along the Rio Grande from southeast to northwest connecting Presidio to La Junta and Ochoa. SH 170 also traverses the southwest portion of Big Bend State Park, which is approximately 50 miles southeast of Presidio. There are also two bridge crossings over the Rio Grande connecting the two sister cities; the Presidio-Ojinaga Railroad and the Presidio-Ojinaga Highway 67. The bridges over the Rio Grande serve as crossing points between Mexico and the United States.

The project area is located in a remote area of southwest Texas near the Rio Grande where traffic is not a major issue. The city has an international bridge, the Presidio Bridge, spanning the Rio Grande to Mexico that allows traffic to flow between the United States and Mexico.

2.6 ENVIRONMENTAL HEALTH

2.6.1 Air Quality

The Clear Air Act, Title 42, Section 7407 of the U.S. Code, states that Air Quality Control Regions (AQCR) shall be designated in interstate and major intrastate areas as deemed necessary or appropriate by a federal administrator for attainment and maintenance of concentration-based standards called National Ambient Air Quality Standards (NAAQS). The USEPA classifies the air quality within an AQCR according to whether the concentration of criteria air pollutants in the atmosphere exceeds primary or secondary NAAQS. All areas within each AQCR are assigned a designation of attainment, nonattainment, unclassifiable attainment, or not designated attainment for each criteria air pollutant. An attainment designation indicates that the air quality within an area is as good as or better than the NAAQS. Nonattainment indicates that air quality within a specific geographical area exceeds applicable NAAQS. Unclassifiable and not designated indicates that the air quality cannot be or has not been classified on the basis of available information as meeting or not meeting the NAAQS and is therefore treated as attainment. Before a nonattainment area is eligible for reclassification to attainment status, the state must demonstrate compliance with NAAQS in the nonattainment area for three consecutive years and demonstrate, through extensive dispersion modeling, that attainment status can be maintained in the future even with community growth.

The levee system for the Presidio FCP area transgresses the southern portions of Presidio County, and is located within AQCR 153, or the El Paso-Las Cruces-Alamogordo Interstate AQCR. This AQCR includes Doña Ana, Lincoln, Sierra, and Otero Counties in New Mexico, and Brewster, Culbertson, El Paso, Hudspeth, Jeff Davis, and Presidio Counties in Texas. As of April 2005, the USEPA designated air quality within all counties of AQCR 153 to be under attainment status for all criteria pollutants, with the exception of Doña Ana and El Paso Counties (USEPA 2006).

The TCEQ has identified no contributors of point source emissions in Presidio County. The area source emission inventory for Presidio County for calendar year 2001, based on the latest available data from USEPA National Emission Inventory as of August 2005 (USEPA 2006), is as follows:

- Carbon monoxide, 4,880 tons per year;
- Volatile organic compounds, 495 tons per year;
- Nitrogen dioxide, 900 tons per year;
- Sulfur oxides, 73.6 tons per year; and
- PM_{10}, 2,518 tons per year.

Existing maintenance activities by USIBWC personnel consists of routine inspections of levees and access roads. Periodic maintenance activities at the levees, channels and floodway results in the use of heavy equipment including scrapers, mowers, bulldozers and dump trucks. Use of these heavy equipment and associated vehicles is typically limited to once every 3 months or less and does not represent a significant source of air pollutants.

2.6.2 Noise

The characteristics of sound include parameters such as amplitude (loudness), frequency (pitch), and duration. Sound varies over an extremely large range of amplitudes. Noise is defined as sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying.

The decibel, a logarithmic unit that accounts for the large variations in amplitude, is the accepted standard unit for describing levels of sound. Different sounds have different frequency contents. Because the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent adjustment (*i.e.*, A-weighted sound level in decibels, or dBA) has been devised to measure sound similar to the way the human hearing system responds. The adjustments in amplitude, established by the American National Standards Institute (ANSI) (ANSI 1983), are applied to the frequency content of the sound.

The day-night average sound level (DNL) is a measure of the total community noise environment. DNL is the average dBA over a 24-hour period, with a 10 dBA adjustment added to the nighttime levels (between 10:00 p.m. and 7:00 a.m.). This adjustment is an effort to account for increased human sensitivity to nighttime noise events. DNL was endorsed by the USEPA for use by federal agencies.

Potential adverse effects of noise include annoyance, speech interference, and hearing loss. Noise annoyance is defined by the USEPA as any negative subjective reaction to noise by an individual or group. Typically, 15 to 25 percent of persons exposed on a long-term basis to DNL of 65 to 70 dBA would be expected to be highly annoyed by noise events, and over 50 percent at DNL greater than 80 dBA (National Academy of Sciences 1977).

In a noisy environment, understanding speech is diminished when speech signals are masked by intruding noises. Based on a variety of studies, DNL 75 dBA indicates there is good probability for frequent speech disruption. This level produces ratings of "barely acceptable" for intelligibility of spoken material. Increasing the level of noise to 80 dBA reduces the intelligibility to zero, even if the people speak in loud voices.

Hearing loss is measured in dBs and refers to a permanent auditory threshold shift of an individual's hearing. The USEPA (USEPA 1974) recommended limiting daily equivalent energy value of equivalent sound level of 70 dBA to protect against hearing impairment over a period of 40 years. Hearing loss projections must be considered conservative as the calculations are based on an average daily outdoor exposure of 16 hours.

Existing maintenance activities by USIBWC personnel consists of routine inspections of levees and access roads. Periodic maintenance activities at the levees, channels and floodway results in the use of heavy equipment including scrapers, mowers, bulldozers and dump trucks. Use of these heavy equipment and associated vehicles is typically limited to once every three months or less and does not represent a significant source of noise

It is recommended that no residential uses, such as homes, multi-family dwellings, dormitories, hotels, and mobile home parks, be located where the noise is expected to exceed a DNL of 65 dBA. Some commercial and industrial uses are considered acceptable where the noise level exceeds DNL of 65 dBA. For outdoor activities, the USEPA recommends DNL of 55 dBA as the sound level below which there is no reason to suspect that the general population will be at risk from any of the impacts of noise (USEPA 1974).

Land-use and zoning classifications surrounding the project areas provide an indication of potential noise impact. Land use in the Presidio FCP area is predominantly agricultural with a small percentage of residential land-use areas. Due to the flood-prone nature of land within the levees, no sensitive noise receptors are located immediately adjacent to the levees (*i.e.*, within 100 feet). Typical existing outdoor noise sources near the levee system include vehicles, pickup trucks, diesel tractor mowers, and other farm machinery. Noise sources such as mowers at 100 feet, and diesel truck or scrapers used to grade levee roads at 50 feet are approximately 70 dBA and 89 dBA, respectively (CERL 1978).

Existing maintenance activities by USIBWC personnel consists of routine inspections of levees and access roads. Periodic maintenance activities at the levees, channels and floodway results in the use of heavy equipment including scrapers, mowers, bulldozers and dump trucks. Use of these heavy equipment and associated vehicles is typically limited to once every 3 months or less and does not represent a significant source of noise.

2.6.3 Public Health and Environmental Hazards

Hazardous materials are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act and the Toxic Substances and Control Act. Hazardous wastes are defined under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery

Act (RCRA). In general, both hazardous substances and wastes include substances that, because of their quantity, concentration, and physical, chemical, or infectious characteristics, may present a danger to public health and/or welfare and to the environment when released or improperly managed.

Public health and environmental hazards were reviewed to identify areas where industrial processes occurred, solid and hazardous wastes were stored, disposed, or released; and hazardous materials or petroleum or its derivatives were stored or used. A data search on waste storage and disposal sites was conducted on January 9, 2007 using EnviroMapper for Envirofacts, an internet service provided by USEPA (USEPA 2007). The facility types that were queried for the Presidio FCP area included Superfund sites, toxic release sites, water dischargers, hazardous waste sites, and multi-activity sites. See Subchapter 3.7.1, for a more detailed discussion of public health and environmental hazards and EnviroMapper.

The search extended along the Presidio FCP area, up to 1 mile from the levee corridor centerline. No Superfund, toxic release, water dischargers, or multi-activity sites were identified for the Presidio FCP area. One hazardous waste site was identified within 1 mile of the levee centerline and within the Presidio city limits.

SECTION 3
ENVIRONMENTAL CONSEQUENCES

This section describes potential environmental consequences in the same sequence as those discussed in the affected environment: water resources; biological resources; cultural resources; land use; socioeconomics resources; and environmental health issues.

3.1 WATER RESOURCES

Impacts to water resources would be considered significant if any of the following were to occur: substantial flooding or erosion; adverse effects on any significant water body (such as stream, lake, or bay); exposure of people to reasonably foreseeable hydrologic hazards such as flooding; or, adverse effects to surface or groundwater quality or quantity. Impacts on water quality would be considered significant when concentrations of indicator parameters exceeded regulatory values for protection of human health and aquatic life.

3.1.1 No Action Alternative

Under the No Action Alternative, O&M of the Presidio FCP would not change from the current management practices. The levee system and current levels of protection associated with the flood control system, water supply, and water management would remain unchanged from current conditions. Under severe storm events, current containment capacity may be insufficient to fully control Rio Grande flooding with risks to personal safety and property.

3.1.2 Enhanced Operation and Maintenance Alternative

Improvements to the Presidio FCP levee system would increase flood containment capacity to control a 100-year storm event. Sediment removal from dredging Cibolo Creek and Alamito Creek would improve channel conditions. The significance and extent of impacts to water resources would be evaluated on a project and site-specific basis. Conformance with federal regulations and coordination with state and local agencies regarding surface water impacts would be required. Notification and permitting procedures for specific proposed actions would be evaluated for each site-specific project prior to construction activities. Best management practices for preventing contamination from storm water runoff during construction activities would be specified in mitigation plans and implemented accordingly. The use of non-potable water during construction would depend upon the climatic conditions and the need to suppress fugitive dust. Water for dust suppression would typically be obtained from nearby surface water bodies or non-potable water wells. Withdrawal permits would be obtained prior to initiation of project activities. No releases of hazardous materials to any ground surface or water drainage would be allowed. Accidental spills or leaks of hazardous materials would be controlled and contained to avoid potential impacts to water resources.

3.1.3 Integrated Water Resources Management Alternative

This alternative includes the same construction activities as the EOM Alternative. Therefore, the analysis and conclusions associated with water resources from the IWR Alternative would be the same as the EOM Alternative. In addition to these construction activities, the IWR Alternative includes water use and conservation measures such as salt cedar management. Water availability would increase as a result of salt cedar removal. Additionally, modified irrigation drain maintenance would be used to improve water quality.

3.1.4 Multipurpose Project Management Alternative

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives, including salt cedar management. Therefore, the analysis and conclusions associated with water resources from the MPM Alternative would be the same as the EOM and IWR Alternatives. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives. Additionally, control of invasive/exotic species, particularly for salt cedar removal, would be endorsed by agencies, farming community, and local authorities. The impacts of the MPM Alternative to water resources would not be considered significant.

3.2 BIOLOGICAL RESOURCES

Biological resources analyses used the following evaluation criteria to assess the impacts of the alternatives:

- Diminished habitat for a plant or animal species;
- Diminished population sizes of regionally important plant or animal species; and
- If the project would interfere with or improve movement of animal species.

3.2.1 No Action Alternative

Vegetation

No changes would be made to improve the levees, to change the floodway management or to change the channel maintenance activities, and therefore no changes to the vegetation in the area would occur. The levee slopes would continue to be mowed on an as-needed basis. The levee slopes would remain primarily invasive grasses that rapidly re-grow after disturbances such as mowing, and native species would not be expected to become established along the levee slopes.

Wildlife

No changes would be made to improve the levees, to change the floodway management or to change the channel maintenance activities, and therefore no changes to the vegetation in the area would occur. If no vegetation changes occur in the area, there would be no expected

changes to wildlife habitat. The on-going mowing of the levee slopes would maintain this habitat as relatively low-quality for wildlife use, except as transit corridors

Threatened and Endangered Species

There would be no expected changes to current habitat occupied by threatened and endangered species. The on-going mowing of the levee slopes would maintain this habitat as relatively low-quality for use by threatened and endangered species, except possibly as a transit corridor.

Parsons (2001) conducted a survey of T&E bird species in the area of the Lower Rio Grande Rectification Project, between American Dam and Fort Quitman, Texas. In this report, several T&E bird species which are likely to occur in the Rectification FCP area were described. No formal studies for the Presidio FCP area have been conducted, but the habitat is expected to be similar, and the effects are expected to be similar. The species that have been described in Parsons (2001) that may also occur in the Presidio FCP area are summarized below.

The Interior Least Tern habitat requirements include the presence of bare or nearly bare alluvial islands or sandbars, favorable water levels during nesting season, and food availability (mainly fish). Within the Presidio FCP area, there is limited suitable habitat for foraging and resting (beaches and sandbars), and there is no suitable nesting habitat available in the project area. On-going sediment removal operations under the No Action Alternative may reduce resting and feeding habitat for reducing the numbers of sandbars and beaches in the study area. The No Action Alternative will not adversely affect the species.

The Northern Aplomado Falcon nests in trees or shrubs, laying eggs between March and June. The general habitat requirements include open desert terrain with scattered trees, relatively low ground cover, an abundance of small to mediums-sized birds as a food source (supplemented with insects, small snakes, lizards, and rodents), and a supply of previously constructed nests, and above ground nesting substrate such as yucca and mesquite. Within the project area, there is no suitable habitat for foraging or nesting. The No Action Alternative would not adversely affect the species.

The Mexican Spotted Owl nest in trees, crevices, or small caves and tend to prefer north facing slopes. The species occurs primarily in forested and canyon habitats, and in Texas occur on cliffs at 5,000 to 7,000 feet in elevation in deep, cool canyons. Within the project area, there is no suitable canyon habitat available. The No Action Alternative would not adversely affect the species.

The Southwestern Willow Flycatcher typically breeds in dense riparian habitats along river, streams, or other wetlands. Vegetation can be dominated by dense growth of willows, seepwillow, or other shrubs and medium sized trees. Nesting may occur in any of these species, and also in salt cedar, box elder, and Russian olive. All nesting habitat trees and shrubs have to have a specific plant and twig structure, regardless of species. Although salt cedar does exist along the river banks, these communities to not meet the minimum patch size and density requirements for the species. In addition, the status of the population in Texas has not been recently quantified (USFWS, 2002). There are historical records of the species

occurring in the Big Bend National Park, but there are no accurate surveys of the population in the area of the Presidio FCP (USFWS, 2002). Given the lack of suitable habitat, and the fact that the species has not been recorded in this area for some time, the No Action Alternative would not adversely affect the species.

In addition to these bird species, there may be other T&E species present in the Presidio FCP area. The habitat, presence of the species or possible effects of on-going mowing and sediment removal operations has not been described for these species. It is not known if the No Action Alternative will adversely affect these species.

Aquatic Ecosystems

Sediment removal would continue on an as-needed basis, which may temporarily improve aquatic habitats by improving flow regimes.

Unique or Sensitive Areas

There are no unique or sensitive areas in the project area, and therefore, they will not be affected.

Wetlands

No changes would be made to improve the levees, to change floodway management, or to change channel maintenance. Therefore, existing wetlands adjacent to the levees will not be affected by dredge and fill operations, by expansion of the levee footprint, or other operations that would inhibit wetland function. Mowing operations do not affect wetlands.

3.2.2 Enhanced Operation and Maintenance Alternative

Vegetation

Levee System. Improvements to the levee system that will improve flood control have the potential to affect vegetation. To meet flood control and water delivery obligations, the levee height will be raised in some locations of the Presidio FCP. In addition to raising the levee, limited structural improvements may be required. Increases in levee height will concomitantly increase the levee footprint. Vegetation would be removed on the levee sidewalls where fill would be added and within the expanded levee footprint. The vegetation of the levee sidewalls is generally composed of invasive grasses that are expected to rapidly reestablish in the area. Structural improvements would remove vegetation on the levee sidewalls. Grasses are expected to rapidly re-establish after the structural improvements are completed.

Floodway Maintenance. The vegetation management may change to include limited projected for streambank stabilization. There are no agricultural leases within the project area, and none will be granted. Vegetation management changes may have the beneficial effect of providing areas for native plant establishment. Streambank stabilization would prevent erosion along the floodplain, which would prevent losses of additional native and non-native vegetation patches.

River Channel. Sediment removal from the river channel and removal of aquatic invasive species would continue on an as-needed basis. Removing sediment and invasive aquatic

species would not directly affect terrestrial vegetation, but may have a beneficial impact in aquatic ecosystems (see below).

Wildlife

Levee improvements that include vegetation removal have the potential to also affect wildlife species. The grasses on the levee slopes provide limited wildlife habitat, but may be used as transit corridors. The non-native grasses present on the levee would be expected to rapidly re-establish after the construction was complete, and the habitat would remain as relatively low-quality habitat, except for use as transit corridors. Most of the wildlife species present are tolerant of some level of human disturbance, and this would not change with levee footprint expansion. Streambank stabilization operations are not expected to adversely affect wildlife species.

Threatened and Endangered Species

Levee height increases will remove some vegetation, and the concomitant footprint expansion may remove habitat that may be utilized by T&E species. On-going mowing operations will affect T&E species as described under the No Action Alternative.

Aquatic Ecosystems

Levee improvements would have no affect on fisheries and aquatic habitats under the EOM Alternative. On-going sediment removal operations may temporarily improve aquatic habitat by increasing flow regimes.

Unique or Sensitive Areas

There are no unique and sensitive areas within the project area..

Wetlands

With levee expansion, it is possible that wetlands may be affected. Direct and indirect impacts to wetlands will be minimized to the extent possible, but if wetlands will be affected by levee expansion, then appropriate USACE permits will be required. If wetlands are impacted, this may alter suitable resting habitat for migratory birds.

3.2.3 Integrated Water Resources Management Alternative

Vegetation

In addition to the actions for the EOM Alternative, for limited reaches of the Presidio FCP area, intensive salt cedar management will occur. This will remove the invasive salt cedar, however, replanting of native riparian species occurs is not included in the project. The salt cedar will rapidly re-establish in the area, and native vegetation is not expected to become established.

Wildlife

Salt cedar management may remove some salt cedar, but native plants are unlikely to become established. This will maintain the salt cedar communities as a relatively low-quality habitat for most wildlife species, except those that currently utilize salt cedar stands.

Threatened and Endangered Species

There are threatened and endangered species, including the southwestern willow flycatcher, that preferentially use native vegetation in riparian corridors compared to salt cedar vegetation for nesting and foraging. Under the IWR Alternative, removal of salt cedar may occur, but the establishment of native vegetation is not expected. Although it is not known if Southwestern Willow Flycatchers have recently attempted to establish breeding territories in the Presidio FCP area, the salt cedar removal under the IWR Alternative would not improve habitat for the flycatcher. The salt cedar that is re-established after clearing would not have suitable twig structure, nor would the trees be large enough, to encourage flycatcher establishment. Under the IWR Alternative, other T&E species would be affected as under the No Action Alternative.

Aquatic Ecosystems

There would be no changes under the IWR Alternative that would affect aquatic ecosystems.

Unique or Sensitive Areas

There are no identified unique or sensitive areas in the Presidio FCP Area.

Wetlands

With levee expansion, it is possible that wetlands may be affected. Direct and indirect impacts to wetlands will be minimized the extent possible, but if wetlands will be affected by levee expansion, then appropriate USACE permits will be required.

3.2.4 Multipurpose Project Management Alternative

Vegetation

In addition to the actions for the IWR Alternative, there are several actions for the MPM Alternative that might affect vegetation. In general, the actions described for the MPM Alternative include regional initiatives, outside the USIBWC scope, and these actions would require multi-agency cooperation to achieve. The action to implement multipurpose use of the jurisdictional floodway in the Presidio area would increase the use of the floodway through development of parks, nature trails and recreational areas. This action would affect the vegetation by removing some vegetation in limited areas. The vegetation removed would likely be invasive grass species, and no removal of unique or sensitive vegetation would be expected. In addition to this action, habitat conservation in riparian corridors may be implemented along very limited reaches of the project area. Extensive salt cedar management or revegetation activities are not expected, as the conflicts with flood control management and USBP activities limit the extensive vegetation of wooded habitats.

Additional regional activities and cooperative agreements would extend beyond USIBWC jurisdiction, but regional cooperative agreements that may affect vegetation may include such actions as control of invasive species outside the USIBWC right-of-way. If this action is combined with native plant re-vegetation, then additional native plants would be established. If

there is no re-vegetation, salt cedar would be expected to rapidly re-establish and native plants would not become established.

Wildlife

Wildlife resources under the MPM alternative rely primarily on cooperative agreements for areas outside USIBWC jurisdiction, and primarily include cooperative agreements to alter invasive vegetation, which, if the invasive vegetation was replace with native vegetation, would improve habitat for both resident and migratory wildlife species, particularly birds. However, if the inavaise vegetation is re-established after clearing, there would be no expected improvements in wildlife habitats.

Threatened and Endangered Species

As for other wildlife species, regional initiatives that preserve and restore suitable wildlife habitat will improve foraging and breeding habitat for threatened and endangered species, both resident species and migratory species.

Aquatic Ecosystems

Aquatic Ecosystems under the MPM alternative will also rely on regional initiatives to improve habitat. Regional initiatives to improve aquatic habitat may include such actions as improving upstream sediment control actions. This initiative would involve cooperation with the National Resources Conservation Service (NRCS). This initiative would improve the quantity and quality of breeding, foraging, and nursery habitat for aquatic species.

Unique or Sensitive Areas

There are no identified unique or sensitive areas within the Presidio FCP Area, and the actions under the MPM Alternative would not affect any presently unidentified unique or sensitive areas.

Wetlands

Under the MPM Alternative, no actions would be taken to improve wetlands. With levee expansion, it is possible that wetlands may be affected. Direct and indirect impacts to wetlands will be minimized the extent possible, but if wetlands will be affected by levee expansion, then appropriate USACE permits will be required.

3.3 CULTURAL RESOURCES

Cultural resources in the Presidio FCP are defined as historic properties that are archeological sites or historic structures. In several cases, archeological sites also contain historic structures. Archeological sites in the project area range in date from the Formative period (A.D. 200 to 1450 [GMI 2005:3-4]) to the historic period. Historic structures are defined as those that were constructed 50 or more years ago. For both of these cultural resource types, the project area encompasses all areas that could be either directly affected by the project, or areas where a change could result in indirect effects to cultural resources.

The responsibility of the USIBWC toward cultural resources is to address the requirements of the NHPA of 1966, as amended, and the ARPA of 1979. Section 106 of the NHPA requires

that historic properties, including archeological sites and historic structures that are eligible for or listed in the NRHP, be taken into consideration during the planning process. The NRHP is the official list of historic properties within the United States that are historically significant due to their research potential in the areas of history, architecture, or archeology. Impacts to cultural resources are considered during the planning of the Presidio FCP because changes to the current system may have the potential to affect the historic integrity of a resource, which could compromise its eligibility for listing in the NRHP. In compliance with Section 106 of the NHPA, consideration of cultural resources includes the identification, evaluation, and protection of the resources.

3.3.1 No Action Alternative

Under the No Action Alternative, O&M of the Presidio FCP would not be modified. No adverse affects are anticipated on historical or archaeological resources.

3.3.2 Enhanced Operation and Maintenance Alternative

Proposed improvements to the Presidio FCP under the EOM Alternative may adversely affect known or potential historic resources by physical changes to the levee configuration or floodway modifications. Similarly, under the EOM Alternative may adversely affect known archeological sites and high probability areas (HPA) that may contain historic or prehistoric archeological materials by mechanical excavation or by burial under the expanded levee footprint.

3.3.3 Integrated Water Resources Management Alternative

Potential improvement measures for the Presidio FCP under the IWR Alternative would be similar to those anticipated for the EOM Alternative. Improvement measures for water use and conservation are not likely to increase the potential to adversely affect historical or archeological resources.

3.3.4 Multipurpose Project Management Alternative

Potential improvement measures for the Presidio FCP under the MPM Alternative would include those anticipated for the EOM Alternative. An increased potential to adversely affect historical or archeological resources could result from actions supported under cooperative agreements.

3.4 LAND USE

This section characterizes land uses in the immediate and general vicinity where project facilities would be located or where those facilities could cause impacts. Impacts to land use would be considered significant if any of the following were to occur: changes in agricultural land use; or changes in recreational use.

3.4.1 No Action Alternative

Under the No Action Alternative, O&M of the Presidio FCP would not change from the current management practices. It does not appear likely that any impacts will occur to surrounding land uses.

3.4.2 Enhanced Operation and Maintenance Alternative

The EOM Alternative includes changes in floodway management that may affect land usage in the immediate project vicinity. Greater restrictions to public use/access of the floodway are anticipated due to increased border patrol operations and designation of restricted use zones. Additional examination of border security regulations in effect at the time EOM Alternatives are designed and implemented is recommended. The amount of grazing land would be reduced due to a policy of reducing grazing leases.

3.4.3 Integrated Water Resources Management Alternative

The land use impacts of the IWR Alternative would include those described as part of the EOM Alternative. Similarly, additional examination of border security regulations is recommended. No additional land use impacts appear to be triggered by the IWR Alternative.

3.4.4 Multipurpose Project Management Alternative

The land use impacts of the MPM Alternative would include those described as part of the EOM Alternative. An additional element of the MPM Alternative has the potential for affecting land use. Upstream sediment controls to remediate a large sediment load from Alamito Creek may require additional improvements. If dams, traps or other improvements are offsite they may affect adjacent land uses as well. If the MPM Alternative project receives federal funding, additional regulatory clearance processes will require further examination of the impact to local and regional land uses.

3.5 SOCIOECONOMIC RESOURCES

A socioeconomic impact would be considered significant if the federal action resulted in substantial growth or concentration of population or the need for substantial new housing or public services.

3.5.1 No Action Alternative

Regional Economics

Under the No Action Alternative, O&M of the Presidio FCP would not change from the current management practices. This alternative would not generate additional business sales, income or employment from construction. Current maintenance practices for the Presidio FCP would continue to provide a steady, long-term benefit by continuing to inject revenue in wages and expenditures into the regional economy every year. The Presidio FCP currently employees

a permanent staff in the USIBWC Presidio Field Office. Assistance from other USIBWC field offices is provided for recurring maintenance operations.

The low-intensity land use in the Presidio FCP area and the fact that the majority of the existing channel, floodways, and levees have been constructed on undeveloped and public lands tends to minimize socioeconomic impacts from the continued operation of the Presidio FCP.

Environmental Justice

Executive Order 12898 requires that each federal agency analyze the human health, economic, and social effects of federal actions, including the effects on minority communities and low-income communities. An impact to environmental justice would be considered significant if the federal action had disproportionately high and/or adverse human health or environmental effects on minority and low-income populations.

The affected area is the footprint of land where potential adverse impacts could result from a planned activity. For this project, these are the areas that could be affected by flood waters of the Rio Grande.

Environmental justice impacts can arise as a result of the uncontrolled flood waters that may cause damage to property. The No Action Alternative would result in the continued control of flood waters using current maintenance practices in accordance with applicable regulatory requirements and, therefore, would not result in any increased in flood and associated health hazards to the immediate community.

No adverse impacts to biological resources, geologic resources (e.g., soils), air quality, noise, and cultural resources would occur for the No Action Alternative. For these reasons, there is no potential for disproportionately high and adverse human health and environmental effects on minority and low-income populations.

Transportation

Under the No Action Alternative, O&M of the Presidio FCP would not change from the current management practices. No additional construction equipment or vehicles would be required if the current operation and maintenance practices were continued. None of the proposed improvement projects would occur and the current configuration of the levee system would be retained. Given the greater restrictions on public use/access to the floodway by increased USBP operations, transportation along the levee roadways is not expected to increase. Traffic levels on interstate, state, and local roadways would not be expected to increase substantially as a result of population growth.

3.5.2 Enhanced Operation and Maintenance Alternative

Regional Economics

The analysis of impacts of EOM activities for the Presidio FCP on socioeconomic resources and environmental justice was based on changes in employment, income, and business volume as indicator criteria, as well as the disproportionate number of minority or

low-income populations potentially affected by the proposed levee improvements. Similar levee improvement projects in the Lower Rio Grande Valley (LRGV) are estimated to cost approximately $1,000,000 per mile of construction over a 10-year period, or $100,000 per year. Since these types of projects are similar to the types of projects proposed under the EOM Alternative for the Presidio Project, this unit cost was used for this analysis. The estimated total cost of all the projects in the LRGV is estimated by USIBWC to cost approximately $125 million over the next 10 years, including environmental documentation, geotechnical investigations, design and construction.

On the basis of an estimated cost of $100,000 per mile of construction per year, cost of the EOM Alternative over a 15-mile reach of the existing levee would be $1,500,000. This amount represents the direct annual influx of federal funds into Presidio County. This influx would have a positive local economic impact, representing an increase of $5,083,520 in direct and indirect sales. Job creation is estimated at 47 in direct and indirect employment. Table III-3.1 illustrates the magnitude of the economic influx relative to reference values for Presidio County.

Table III-3.1 Economic Impacts of EOM Alternative in Presidio County

Evaluation Criteria	Unit Value for Rio Grande Levees [a]	EOM Alternative	Annual Value for Presidio County	Change Relative to Presidio County
Local Expenditures	$ 1,000,000	$ 1,500,000	Not applicable	
Direct Employment	19	29		
Indirect Employment	12	18		
Total Employment	31	47	2,657 [b]	1.8%
Direct Sales Volume	$ 1,274,065	$ 1,911,098		
Indirect Sales Volume	$ 2,114,948	$ 3,172,422		
Total Sales Volume	$ 3,389,013	$ 5,083,520	$47,418,100 [c]	10.7%
Direct Income	$ 554,814	$ 832,221		
Indirect Income	$ 452,466	$ 678,699		
Total Income	$ 1,007,280	$1,510,920	$76,895,676 [d]	2%

[a] Unit data for levee construction from the USIBWC Rio Grande Canalization Project (Parsons 2004).
[b] Total of the labor force (16 years and older) employed in 2005 (Texas Workforce Commission 2007).
[c] Estimated Gross sales for Presidio County in 2005 (Texas Comptroller of Public Accounts 2005).
[d] Based on a 2000 per capita income of $9,958 and an Presidio County population of 7,722.

Floodway maintenance is expected to continue under the existing agreement with the U.S. Border Patrol. Small-scale changes are possible in extent or timing of vegetation removal which would not have an economic impact. The EOM Alternative would not result in significant impacts to regional economics.

Environmental Justice

Executive Order 12898 requires that each federal agency analyze the human health, economic, and social effects of federal actions, including the effects on minority communities and low-income communities. An impact to environmental justice would be considered significant if the federal action had disproportionately high and/or adverse human health or environmental effects on minority and low-income populations.

The affected area is the footprint of land where potential adverse impacts could result from a planned activity. For this project, these are the areas that could be affected by flood waters of the Rio Grande.

Environmental justice impacts can arise as a result of the uncontrolled flood waters that may cause damage to property. The No Action Alternative would result in the continued control of flood waters using current maintenance practices in accordance with applicable regulatory requirements and, therefore, would not result in any increased in flood and associated health hazards to the immediate community.

Impacts to biological resources, geologic resources (e.g., soils), air quality, noise, and cultural resources would not be expected as a result of the No Action Alternative. For these reasons, disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.

Transportation

Under the EOM Alternative, construction would include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 USACE study. Small localized projects of streambank stabilization are also possible. All construction activities would occur within the existing USIBWC ROW and government lands and on private property in the lower part of the levee system, which is used for grazing. Transportation of construction equipment and the use of personnel vehicles would mainly occur within the levee ROW and along the levee road system within the floodway.

Heavy construction equipment (dump trucks, front-end loaders, graders) would initially be driven to the construction site from other areas of the city and Marfa using SH 67 or SH 170 from the south. During construction, a temporary increase in the use of access roads would take place for placement of equipment in staging areas. Most of the subsequent construction activities, however, would not require public road use as material borrow sites would be located in the vicinity of the construction sites. Following completion of the proposed improvements, the levee road would continue providing service for USIBWC and the USBP activities.

Construction vehicles associated with environmental measures within the floodway (such as erosion protection, sediment management.) would access levee roadways. An increase in transportation on some of the levee roadways from commercial vehicles would likely occur due to primarily disposal of sediment outside the floodway during river channel maintenance. It is anticipated that there would be no significant effect on traffic flow from project construction.

This increased construction related traffic would be an inconvenience to commuters traveling on IH 67 and SH 170 during the morning commute (the project construction traffic in the evening would occur before the primary evening commute hour). This impact on traffic and circulation on the affected roadways would be temporary and not considered significant, only lasting during the construction period.

3.5.3 Integrated Water Resources Management Alternative

Regional Economics

Levee improvement activities involving construction for this alternative would be similar to the EOM Alternative. Therefore, the analysis and conclusions associated with socioeconomic resources and environmental justice from the IWR Alternative would be the same as the EOM Alternative.

The IWR Alternative would result in possible small-scale changes in the timing and/or extent for removal and management of salt cedar. These changes to ongoing operations and maintenance at the Rio Grande flood control facilities would not be expected to result in any direct or indirect impacts to population, employment, income or housing.

Environmental Justice

As discussed for the EOM Alternative, disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected for the IWR Alternative.

Transportation

Traffic levels for this alternative would not vary from the EOM Alternative. This alternative would generate the same effects on traffic. The increase in traffic levels would not be substantial in relation to the existing traffic load and capacity of the roadway system.

3.5.4 Multipurpose Project Management Alternative

Regional Economics

Levee improvement activities for this alternative involving construction would be similar to the EOM Alternative. Therefore, the analysis and conclusions associated with socioeconomic resources and environmental justice from the MPM Alternative would be the same as the EOM Alternative.

The MPM Alternative would result in possible small-scale changes in the timing and/or extent for participation of salt cedar removal initiatives identified on a regional basis. These changes to ongoing operations and maintenance at the Rio Grande flood control facilities would not be expected to result in any direct or indirect impacts to population, employment, income or housing.

Environmental Justice

As discussed for the EOM and IWR Alternatives, disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected for the MPM Alternative.

Transportation

Traffic levels for this alternative would not vary from the EOM and IWR Alternatives. This alternative would generate the same effects on traffic. The increase in traffic levels would not be substantial in relation to the existing traffic load and capacity of the roadway system.

3.6 ENVIRONMENTAL HEALTH

Evaluation criteria considered in air quality analysis include the following.

- Would emissions from the action cause or contribute to a violation of any national, state, or local ambient air quality standard?
- Would emissions from the action represent 10 percent or more of the emissions inventory for the affected AQCR counties, to be considered regionally significant?

The following evaluation criteria were used to determine the impacts of noise:

- The degree to which noise levels generated by demolition and construction activities would be greater than the ambient noise levels;
- The degree to which there would be annoyance, speech interference, and hearing loss; and
- The proximity of noise-sensitive receptors to the noise source.

The evaluation criteria listed below were used to assess the alternatives with regard to hazardous materials and waste.

- Would the action violate federal or state regulations for hazardous waste usage, storage, or disposal?
- Could the action require materials that could not be accommodated by existing guidance?
- Would there be human exposure to hazardous wastes or materials due to the action?
- Would the action cause hazardous waste generation that could not be accommodated by current waste management practices.

3.6.1 No Action Alternative

Under the No Action Alternative, O&M of the Presidio FCP would not change from the current management practices.

Air Quality

Existing air emissions from current practices are established in the emissions inventory for Presidio County. None of the proposed improvement projects would occur and the current configuration of the levee system would be retained under the No Action Alternative. The No Action Alternative would not contribute to a violation of any national, state, or local ambient air quality standard, and would not raise the emissions for Presidio County beyond 10 percent

of the counties' current estimated emissions inventory. Air emissions would not be expected to increase beyond the established emissions inventory in the Presidio FCP area.

Noise

Under the No Action Alternative, O&M of the Presidio FCP would not change from the current management practices. None of the proposed improvement projects would occur and the current configuration of the levee system would be retained.

As stated under the affected environment, no sensitive noise receptors (*i.e.,* schools, churches, and medical facilities) are located immediately adjacent to the levees (*i.e.,* within 100 feet). Therefore, there would be no significant impacts due to noise from current levee maintenance activities.

Public Health and Environmental Hazards

Hazardous material practices of the USIBWC are in compliance with applicable standards under the current operations and maintenance practices. Storage of diesel fuel and refueling of vehicles and equipment is performed in compliance with applicable state and federal standards. No hazardous materials sites are currently affected by operations and maintenance activities. Therefore, current USIBWC practices would not affect hazardous materials handling, nor any facilities or sites in the project area.

The Presidio FCP would continue to implement current maintenance practices such as resurfacing roadways of the levee system and floodway maintenance activities. This alternative would not result in exposure to any contamination on the site, and there are no remediation activities ongoing at the Presidio FCP. For these reasons, impacts to public health and environmental hazards would not occur.

3.6.2 Enhanced Operation and Maintenance Alternative

Air Quality

Under the EOM Alternative, construction would include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 USACE study. Small localized projects of stream bank stabilization are also possible, but would not contribute significant amounts of air emissions.

The levee system for the Presidio FCP area transgresses through the southern portion of Presidio County, and is located within AQCR 153. AQCR 153 is under attainment status for all criteria pollutants, except for Doña Ana and El Paso Counties (USEPA 2006). Impacts to air quality in attainment areas would be considered significant if pollutant emissions associated with the implementation of the EOM Alternative caused or contributed to the exceedance of any national, state, or local ambient air quality standard; or represented an increase of 10 percent or more in the affected counties emissions inventory.

The height of the levees in the Presidio FCP area varies from 12 to 35 feet, and the crest width varies from 8 to 12 feet. Assuming the average of the range of height and crest widths (24 feet by 10 feet, respectively), and a 3:1 ratio for levee height to length of slope, the current

total surface width of the levee in the Presidio FCP area would be approximated at 154 feet. For the purposes of this analysis, a conservative assumption for increase in the levee height is 4 feet for the EOM Alternative. This increase in height would translate to an approximate increase of levee surface width by 24 feet. Assuming a new levee surface width of 178 feet, the total disturbed area of the EOM Alternative improvements would be estimated at 939,840 square feet per mile. There are approximately 15 miles of levee length in the Presidio FCP area, including the spur levees. Only 7.5 of the 15 miles of levee would be improved; therefore, a length of 7.5 miles was used to estimate air emissions for the EOM Alternative.

Air emissions were calculated for the EOM Alternative based on per mile unit annual emissions estimates, listed in Table III-3.2. Unit air emissions estimates were based on common construction practices and methods (Means 2005) and emission factors reported by USEPA (USEPA 1996). Unit emissions were calculated based an estimated disturbed area per mile, assuming a construction timeframe of 6 months. Unit emissions were then multiplied by the length of the EOM Alternative affected areas, to estimate air emissions for the alternative.

Table III-3.2 Potential Air Emissions of EOM Alternative

	Emissions (tons per year)				
	Sulfur Oxides	**Nitrogen Dioxides**	**Carbon Monoxide**	**Volatile Organic Compounds**	**Particulate Matter (PM_{10})**
Increase levee height, unit emissions (per mile)	0.32	2.58	17.75	0.89	5.08
EOM Alternative in Presidio County (7.5 miles)	2.4	19.4	133.1	6.7	38.1
Presidio County Emissions Inventory (USEPA 2006)	*73.6*	*900*	*4,880*	*495*	*2,518*
Emissions as a Percent of County:	3.3%	2.2%	2.7%	1.4%	1.5%

Improvements to the levee through the EOM Alternative would not impact air quality through excavation and fill activities. An increase in localized criteria air pollutants would occur due to emissions associated with increasing the existing levee height. Table III-3.2 summarizes the estimated criteria pollutant emissions associated with the EOM Alternative, as well as the percent increase above the existing county emissions inventory. Criteria pollutant increases in Presidio County by levee construction under the EOM Alternative would range from 1.4 to 3.3 percent above the No Action Alternative and would not be considered regionally significant.

Noise

Land use in the Presidio FCP area is predominantly agricultural with a limited percentage through urban areas in the upper reach of the levee, or the area associated Presidio. Due to the flood-prone nature of land within the levees, no sensitive noise receptors are located immediately adjacent to the levees (*i.e.,* within 100 feet). Sensitive receptors would include schools, churches, and medical facilities. Typical outdoor noise sources associated with the EOM Alternative levee improvements would include pickup trucks, diesel dump trucks, diesel tractor bulldozers, rollers, pavers, and scrapers.

For outdoor activities, a DNL of 55 dBA is the sound level below which there is no reason to suspect potential hearing loss from the impacts of noise. A DNL of 75 dBA indicates there is good probability for frequent speech disruption or annoyance. Therefore, a range of 55 dBA to 75 dBA of noise from the EOM Alternative would be considered an impact due to speech disruption or annoyance, and potential hearing loss. Noise sources associated with the EOM Alternative construction activities, such as diesel trucks or scrapers, produce an approximate noise level of 89 dBA at 50 feet (CERL 1978). Noise levels at 100 feet would be reduced, but may still be above 55 dBA.

Under the EOM Alternative, construction would include improvements to the levee system described under air quality for this alternative. Noise levels would not greatly increase above the No Action Alternative since current USIBWC operations entail the use of construction equipment to maintain the levee system. This alternative would generate the same effects; therefore, there would be no significant impact from EOM Alternative project construction noise.

Elevated noise levels can interfere with speech, causing annoyance or communication difficulties. As discussed in more detail in Subsection 3.6.2 of Chapter II, Rio Grande Rectification Project, there is a good probability of speech disruption from construction noise at levels above DNL 75 dBA. Persons conducting conversations within the project area could have their speech disrupted by construction-generated noise. Speech disruption would be temporary, lasting only as long as the noise-producing event. There would be no significant impacts from EOM Alternative noise.

Public Health and Environmental Hazards

Under the EOM Alternative, construction would include improvements to the levee system described under air quality in this subchapter. Hazardous and/or toxic products (*e.g.*, fuel, oil, grease, and hydraulic fluid) would be used from operating construction equipment. Implementing established industry practices for controlling releases of these substances would reduce the possibility of accidental releases of these products. Preventive maintenance and daily inspections of the equipment would ensure that any releases of these hazardous materials are minimized. All visible dirt, grime, grease, oil, loose paint, etc., would be removed from the equipment prior to use at the construction sites.

Since the risk of an accidental release of hazardous and/or toxic chemicals or waste is minimal, and implementation of the EOM Alternative would not result in noncompliance with applicable federal or state regulations, it is anticipated that there would be no hazardous and/or toxic waste impacts from the proposed construction activities.

Improvements to the levee system would not be affected by waste storage and disposal sites. One hazardous waste site was identified within the Presidio city limits. The site would not affect, or be affected by the proposed levee construction project.

3.6.3 Integrated Water Resources Management Alternative

Air Quality

This alternative includes the same construction activities as the EOM Alternative; therefore, the analysis and conclusions for the EOM Alternative apply to this alternative. In addition to these construction activities, the IWR Alternative includes water use and conservation measures such as salt cedar management along the channel and at arroyo mouths. Conservation measures would not have an impact on air quality.

Noise

Noise levels for this alternative would not vary from the construction activities described under the EOM Alternative. This alternative would generate the same effects; therefore, there would be no significant impact from IWR Alternative project construction noise.

Public Health and Environmental Hazards

This alternative includes the same construction activities as EOM Alternative; therefore, the analysis and conclusions for the EOM Alternative apply to this alternative. In addition to these construction activities, the IWR Alternative includes conservation measures such as salt cedar management along the channel and at arroyo mouths. Hazardous materials usage and waste sites would not affect conservation measures.

3.6.4 Multipurpose Project Management Alternative

Air Quality

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives; therefore, the analysis and conclusions for these alternatives apply. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives to control invasive/exotic species and flow regime modification to provide year-round baseflow. The MPM Alternative would not have an impact on air quality.

Noise

Noise levels for this alternative would not vary from the construction activities described under the EOM Alternative. This alternative would generate the same effects; therefore, there would be no significant impact from MPM Alternative project construction noise.

Public Health and Environmental Health

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives; therefore, the analysis and conclusions for these alternatives apply. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives to control invasive/exotic species and flow regime modification to provide year-round baseflow..

3.7 INDIRECT AND CUMULATIVE IMPACTS

Cumulative impacts considered for the Presidio FCP include greater restrictions to public use/access of the floodway due to increased USBP operations and designation of restricted use zones.

The actions would include the full support from JTF-6 to the INS strategy for enforcement activities within a 50-mile corridor along the U.S./Mexico border. The enforcement activities would allow INS to gain and maintain control of the southwest border-area for the purpose of enhancing in the prevention, deterrence and detection of illegal activities. JTF-6's support would fall within three major categories: operational (e.g., conduct of ground patrols Listening Post/Observation Post), engineering (e.g., design and construction of training facilities, buildings, border, roads, fences, and lighting), and general (e.g., data analysis and processing, interpretation of aerial photographs). The actions also include the implementation of INS' Integrated Surveillance Intelligence System (ISIS) which includes installation and monitoring remote sensing system such as ground sensors, low level television cameras, and remote video surveillance systems. The activities proposed by INS and the support provided by JTF-6 allow INS to conduct its investigation, apprehension and patrolling activities more efficiently and effectively; thus reducing the flow of illegal drugs into the United States. This program complies with the Immigration and Nationality Act, Illegal Immigration Reform and Immigrant Responsibility Act, other INS regulations as found in Title 8 of the U.S. Code, National Defense Authorization Act and the President's National Drug Control Strategy.

The cumulative effect of INS/JTF-6 actions since the inception of the program (1989) would be approximately 10,600 acres of vegetation being altered. Most of these effects have occurred or would occur within semi-desert grasslands and/or scrublands. Less than 5-acres of wetlands have been disturbed during this period.

Since 1994, no pertinent cultural resources site or structure has incurred significant impacts due to INS or JTF-6 activities. Over 100 new sites potentially eligible for listing on the NRHP have been identified as a result of INS/JTF-6 projects. Due to the policy of avoidance employed by INS and JTF-6, no long-term or cumulative impacts to cultural resources are expected. In the event avoidance is not possible, testing, excavation and mitigation have been employed and coordinated through the appropriate SHPO and/or Native American Nation.

Impacts to air quality, noise, and water supply and quality would be temporary and minor. Since the projects proposed under the USBP initiatives are similar in type, number and magnitude to those projects that have been completed, no long-term or cumulative adverse impacts to these resources are anticipated.

Soil erosion would occur around construction sites. However, implementation of Stormwater Pollution Prevention Plan and best management practices would alleviate the potential of soil erosion. Further, most of the road improvement projects undertaken by INS and JTR-6 are required due to existing soil erosion that has made roads used for patrol impassable. Consequently, such road improvement projects actually decrease soil erosion problems and the indirect effects to aquatic environs through sedimentation.

Direct economic benefits at the local and regional level would produce insignificant and temporary, direct economic benefits. These benefits would be realized through purchase of construction materials, other project-related expenditures, and temporary labor. Long-term indirect socioeconomic benefits would result from the reduction of drug trafficking and the social costs associated with such activities.

DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

IMPROVEMENTS TO USIBWC RIO GRANDE FLOOD CONTROL PROJECTS ALONG THE TEXAS-MEXICO BORDER

CHAPTER IV
LOWER RIO GRANDE FLOOD CONTROL PROJECT

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SECTION 1
DESCRIPTION OF ALTERNATIVES

This section identifies measures associated with four alternatives for improvement of the flood control projects selected or the PEIS evaluation: a No Action Alternative, the continued implementation of current operation and maintenance (O&M) practices, and three action alternatives: Enhanced Operation and Maintenance (EOM) Alternative, Integrated Water Resources Management (IWR) Alternative; and Multipurpose Project Management (MPM) Alternative. Section 1 also includes an evaluation of actions with potential cumulative effects, and a summary of environmental consequences subsequently evaluated in detail by resource area in Section 3.

1.1 NO ACTION ALTERNATIVE

The Lower Rio Grande Flood Control Project (Lower Rio Grande FCP) extends approximately 186 miles from Peñitas, Texas to the mouth of the river in the Gulf of Mexico. The project was the result of a 1932 agreement between the United States and Mexico to provide flood protection to urban, suburban, and agricultural lands in both countries. Figure 6, in Chapter I, shows the overall project location, and individual maps are provided for the upper river reach of the Lower Rio Grande FCP and the Main Floodway (Figure 7), the lower river reach of the Lower Rio Grande FCP (Figure 8), and the North and Arroyo Colorado Floodways (Figure 9).

The Lower Rio Grande FCP consists of the river channel, flood levees in each country, two diversion dams, and off-river floodways in Mexico and the United States. Some river straightening took place between 1976 an 1977 on a 9,000-foot length of river upstream of Hidalgo and Reynosa. The depth of the river channel varies from 1 to 15 feet.

Two diversion dams, Anzalduas and Retamal, were constructed to route most of the flood flows in the off-river floodway systems of the United States and Mexico, respectively. Anzalduas Dam also diverts irrigation flows into Mexico. The interior floodway system in the United States has a total area of 27,013 acres between the levees in Hidalgo, Cameron, and Willacy Counties.

The United States portion of the project includes 102 miles of levees along the Rio Grande, and 168 miles in an off-stream, interior floodway system. This off-stream system consists of a Main Floodway that separates into the North Floodway and the Arroyo Colorado Floodway at the City of Mercedes. The levee system has an average levee height of approximately 15 feet, an average base width of 90 to 120 feet, and an average crown width of 14 to 16 feet. Levee separation is between 600 feet to 1 mile.

The project was designed and built for a flood of 250,000 cfs at Rio Grande City. During the design flood, 105,000 cfs would be diverted to the United States' off-river floodways at Anzalduas Dam, and 105,000 cfs would be diverted to Mexico's off-river floodway system at Retamal Dam. Diversion of flows at the two dams and water losses between Rio Grande City

and the diversions would result in the passage of a maximum of 20,000 cfs through the Brownsville-Matamoros area.

1.1.1 Levee System Maintenance

The USIBWC conducts the following activities for maintenance of the Lower Rio Grande FCP levee system, either routinely or on an as-needed basis:

- Blading of levees annually and repair erosion-related damage
- Reconditioning and maintaining roadway in the interior floodways; same practices as used on Rio Grande levees and ROWs

Levee maintenance activities include annual mowing, reconditioning levees with bulldozers, limited application of herbicides such as around irrigation and drainage structures and along guardrails or fence lines, blading and rolling of roadways that have subgrade to maintain a 14 to 16-foot width, and surfacing levee roads with caliche. Mowing and reconditioning occur on all levees in the system..

1.1.2 Floodway Maintenance

The USIBWC conducts the following activities for maintenance of the Lower Rio Grande FCP floodway, either routinely or on an as-needed basis:

- Mow 8,000 acres of floodway annually to control weeds and woody vegetation and remove debris; on high banks, hand clear vegetation every 5 years
- Mow grass to ground surface except where stipulated by the Biological Opinion (river miles 62.6 to mile 50.6 and 58.7 to 54.0)
- Clear stream bank of vegetation annually between river mile 28.0 to river mile 62.5.
- Interior Floodways – Mow, clean pilot channels and lateral drains of vegetation and silt.

The floodway is smoothed to ensure floodway capacity, keep irregularities from forming due to deposits, and facilitate mowing. USIBWC maintains 27,013 acres of floodway system. In the interior channels, much of the floodway area is dedicated to crops. Maintenance activities in the floodways not dedicated to crops, golf course, or other use include vegetation control such as mowing and brush clearing, sediment removal, floodway smoothing, and maintenance of the two diversion dams. The USIBWC mows about 8,000 acres of floodway area per year.

Vegetation control includes annual channel bank mowing in the Brownsville-Matamoros area between river mile 28.0 and river mile 62.5 in a 75-foot wide tract from the river's low water. In addition, steep banks are hand-cleared using chain saws every 5 years. Vegetation clearing along the high bank is limited to trimming the vertical vegetation by hand no more than every 5 years by cutting the branches overhanging the river that may capture flood debris.

Outside the 75-foot wide cleared tract in the area between river mile 28.00 and river mile 62.5, there is a 33-foot wide wildlife corridor that is not cleared in any way. Beyond the wildlife corridor, there is a 150-foot wide cleared and mowed strip of land, serving as a buffer between the wildlife corridor and the toe of the levee.

Upstream of river mile 62.5, levee slopes are mowed to about 15 feet beyond the toe of the levee; there is only minimal vegetation clearing between the mowed area at the levee. Mowing in the Brownsville area begins in June of each year so the floodways will be in good condition during the flooding season. Mowing in other areas is done year-round.

Between river miles 55.2 to 45.0, the USIBWC has in place a Restricted Use Zone that limits construction activities that would cause flow deflections or obstructions

Two golf courses are located in the interior floodway on land for which the USIBWC has a right-of-way. One located downstream of the inlet to the North Floodway, and one is downstream of FM 491 in the North Floodway. A third golf course is on USIBWC land on the Rio Grande at Fort Brown in the Brownsville area. The land is currently leased to the University of Texas at Brownsville for operation by the University. The USIBWC also owns most of the Anzalduas Park at the entrance to the interior floodway. The land is leased to Hidalgo County for operation. There is a hike and bike trail in the Arroyo Colorado floodplain in Harlingen, and a hike and bike trail in Hidalgo, which includes a ½ mile segment along the top of the levee, is under construction.

Multiple practices associated with environmental improvements and agency coordination apply to the Lower Rio Grande FCP:

- Follow vegetation maintenance requirements of 1993 and 2003 Biological Opinions, including mowing limited to the June-August period.
- Maintain 33-foot wildlife corridor on land side of 75-foot maintenance strip, mow 15-foot strip between wildlife corridor and levee from river mile 62.5 to river mile 28).
- Mow grass to ground surface except where vegetation must be greater than 3 feet above ground surface as stipulated by the Biological Opinion for protection of threatened or endangered habitat (river mile 62.6 to river mile 50.6 and river mile 58.7 to river mile 54.0).

1.1.3 River Channel Maintenance

The USIBWC conducts the following activities for maintenance of the Lower Rio Grande FCP river channel, either routinely or on an as-needed basis:

- Perform structural repairs and modifications to dams, river gages, as needed
- Perform annual structural repairs on spillway gates of Anzalduas Dam and Retamal Dam as well
- Remove sediment from the channel as needed, and at mouth of Rio Grande

The lower reach of the Lower Rio Grande FCP suffers from periodic infestations of water hyacinth (floating) and hydrilla (on river bottom) that choke the channel, causing water delivery problems and loss of aquatic habitat. High flow episodes flush noxious vegetation downstream and out into the Gulf of Mexico. Partially funded by the USIBWC, the State of Texas removes hyacinth and hydrilla throughout the Lower Rio Grande FCP. Additional steps may be needed during low flow periods to control these infestations.

1.2 ENHANCED O&M (EOM)

Possible or likely actions for flood control improvements and changes in water delivery, summarized in Table II-2.1, are discussed below. Improvements to the river channel do not apply to the interior floodways system.

Levee System. Improvements to the system are needed, particularly in the upper, 30-mile reach of the Lower Rio Grande FCP where required height increases are typically greater than 4 feet. Structural improvements, consistent with USACE 2004 recommendations, are also needed in multiple sections along the river levee system.

Floodway Maintenance. Changes in vegetation removal from the floodway, in terms of timing or extent of mowing, are possible in the upper reach of the Lower Rio Grande FCP (upstream of RM 62.5). In the lower reach, vegetation management is dictated by an existing USFWS Biological Opinion and, thus, not likely to undergo significant changes. An increase is expected on restrictions to public use of the floodway, as well as retention of existing Restricted Use Zones. Streambank stabilization by bioengineered techniques is not anticipated at a large scale.

River Channel. The need for sediment removal from the channel for boundary stabilization and reopening of mouth of Rio Grande will continue on an as-needed basis. Additional actions to eradicate aquatic invasive species from the Lower Rio Grande FCP lower reach could be implemented. No changes in debris removal practices are anticipated. There are no USIBWC plans for new water diversion structures or changes to existing ones.

Operation and Maintenance of Interior Floodways. No substantial deficiencies have been identified for the interior levee system; in some locations, height increases smaller that 2 feet are required. Current uses of the interior floodways (seasonal agriculture and golf course use) are expected to continue in the future.

Table IV-1.1 Potential Improvements for the Lower Rio Grande FCP

LOWER RIO GRANDE FLOOD CONTROL PROJECT	ALTERNATIVE*			Anticipated Change Relative to the No Action Alternative
	EOM	IWR	MPM	
1. FLOOD CONTROL SYSTEM ALONG THE RIO GRANDE				
Levee Improvements				
Levee height increase	X	X	X	Improvement projects required based on hydraulic modeling. More significant height increase is required in the upper 30-mile reach
Structural levee improvements	X	X	X	Improvement projects required along multiple sections to implement USACE 2004 recommendations.
Changes in Floodway Management				
Restricted Use Zones	X	X	X	Present at various locations and likely to increase as more restrictions on public use/access are expected
Changes in Channel Maintenance				
Sediment removal and disposal	X	X	X	Additional projects are possibly needed for boundary stabilization, improved stream flow
Shore/aquatic vegetation removal	X	X	X	Increased participation in programs to eradicate aquatic invasive species from lower reach of LRGFCP
2. INTERIOR FLOODWAY SYSTEM				
Levee Improvements				
Levee height increase	X	X	X	Improvement projects required for some segments of the Interior Floodways
Changes in Floodway Management				
Vegetation management practices	X	X	X	Changes compatible with flood control are possible in extent of seasonal agriculture or management of
INTEGRATED WATER RESOURCES MANAGEMENT				
Water Use and Conservation				
Irrigation BMPs to increase water delivery efficiency		X	X	Possible in coordination with irrigation districts; measure is not likely to be an USIBWC initiative
Water Quality				
Modified irrigation drain maintenance		X	X	Possible cooperation plans with irrigation districts to improve return flow quality
MULTIPURPOSE PROJECT MANAGEMENT				
Cooperative Agreements and Regional Initiatives				
Vegetation removal and timing/extent of mowing			X	Changes in vegetation management are possible in the upper reach but limited in the lower reach by requirements of the USFWS Biological Opinion
Control of invasive/exotic species outside ROW			X	Increased USIBWC participation would be limited to regional initiatives (i.e. Aquatic Weed Taskforce)
Wildlife habitat conservation inside or outside ROW			X	Possible participation in multi-agency regional habitat conservation initiatives
Watershed management for sediment control			X	Implementation possible as support to NRCS/regional initiatives

**EOM: Enhanced O&M; IWR: Integrated Water Resources Management; MPM: Multipurpose Project Management*

1.3 INTEGRATED WATER RESOURCES MANAGEMENT (IWR)

In addition to those measures included in the EOM Alternative, possible/likely actions for improvements to floodway use and water resources management are summarized in Table II-2.1 and discussed below. Actions related to water resources management are not directly applicable to the interior floodway system.

Water Use and Conservation Practices. Implementation of irrigation best management practices to increase water delivery efficiency is possible; this measure is likely to be an initiative by irrigation districts supported by the USIBWC. Direct implementation of salt cedar control and revegetation with low-water use species in the very limited USIBWC jurisdictional floodway is not anticipated.

Improvements to Water Quality. The USIBWC will continue its cooperation with the Texas Clean River Program and other water quality programs. Modified irrigation drain maintenance to improve water quality is possible but not likely an USIBWC initiative.

1.4 MULTIPURPOSE PROJECT MANAGEMENT (MPM)

In addition to measures included in the IWR Alternative, possible or likely actions for multipurpose use of the jurisdictional floodway are summarized in Table II-2.1. There is a minimum potential for additional use of the jurisdictional floodway since it is confined to narrow corridors along the levee system and stream banks. Most of the river floodway is privately owned or used for natural resources management.

Cooperative agreements and environmental initiatives that could be implemented along the Lower Rio Grande FCP include:

- Control of invasive/exotic species outside the jurisdictional floodway and participation in regional initiatives such as the Aquatic Weed Taskforce
- Participation in regional multi-agency habitat conservation initiatives including aquatic habitat improvements (for example, increase of backwaters at mouth of arroyos)
- Because USIBWC has no ownership or direct control of extent/timing of water releases, a flow regime modification to maintain or increase year-round baseflow would be viable only as a regional, multiagency initiative
- Support of NRCS/regional initiatives for sediment control through watershed management

Due to conflicts with project mission or limited availability of jurisdictional floodway, habitat development by levee setbacks or reconnection of historic, low-elevation meanders is not considered a viable measure.

1.5 OTHER ACTIONS WITH POTENTIAL CUMULATIVE IMPACTS

A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts most likely arise when a relationship exists between a proposed action and other actions that are expected to occur in a similar location or during a similar time period. Actions occurring in the same location or in proximity to each other would be expected to have more potential for cumulative impacts than geographically separated actions. Similarly, actions that coincide, even partially, in time would tend to offer a higher potential for cumulative impacts.

Actions with potential cumulative effects include changes in U.S. Border Patrol Operations, and anticipated infrastructure projects to be implemented by federal government agencies other than the USIBWC, or local governments. The analysis of cumulative impacts resulting from incremental effects of the alternatives when added to other past, present, and reasonably foreseeable future actions, is presented in Section 3.7.

1.5.1 United States Border Patrol Operations

Several actions have been identified by the USBP during the same period as those for the USIBWC. The USBP actions would include the full support from Joint Task Force-Six (JTF-6) to the Immigration and Naturalization Service (INS) strategy for enforcement activities within a 50-mile corridor along the U.S./Mexico border. Findings of the INS evaluation are presented in the 2001 document *Final Report, Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities.*

The enforcement activities would allow INS to gain and maintain control of the southwest border- area for the purpose of enhancing in the prevention, deterrence and detection of illegal activities. JTF-6's support would fall within three major categories: operational (e.g., conduct of ground patrols Listening Post/Observation Post), engineering (e.g., design and construction of training facilities, buildings, border, roads, fences, and lighting), and general (e.g., data analysis and processing, interpretation of aerial photographs). The actions also include the implementation of INS' Integrated Surveillance Intelligence System which includes installation and monitoring remote sensing system such as ground sensors, low level television cameras, and remote video surveillance systems. The activities proposed by INS and the support provided by JTF-6 allow INS to conduct its investigation, apprehension and patrolling activities more efficiently and effectively; thus reducing the flow of illegal drugs into the United States.

The Lower Rio Grande FCP is located within the 50-mile INS enforcement corridor. While INS actions are not part of the alternatives evaluated in this PEIS, they are addressed herein in the context of potential cumulative impacts. Typical INS actions with potential cumulative impacts on the USIBWC flood control project are those associated with floodway use (e.g., vegetation control) and engineering (e.g., road construction and maintenance, and placement of fences and lighting).

Actions proposed for the Lower Rio Grande were specified in the Operation Rio Grande in Starr, Hidalgo and Cameron Counties, Texas. A description of those actions was summarized, and evaluated for environmental effects, in a Biological Opinion issued by the USFWS on February 3, 2003 (USFWS 2003a). Proposed actions, as described in the Biological Opinion, include placement of lighting, fences and boat ramps, road improvements and vegetation mowing at six locations (Rio Grande City, McAllen, Mercedes, Harligen, Brownsville, and Port Isabel). An additional proposed action, currently under development, is an extensive border fence system. As currently envisioned, a 70 to 86 miles of fence system would be constructed. While specific fence locations have not yet been fully defined, the system would be placed outside Lower Rio Grande FCP, inland from levee flood control system.

1.5.2 Future Infrastructure Projects

New infrascture projects that would be located within the Lower Rio Grande FCP geographic area include the Brownsville Weir, proposed for construction at River Mile 48.7, and new international bridges.

The City of Brownsville has proposed construction of a weir across the Rio Grande to meet future municipal and industrial water needs for a service area covering southern and southeastern Cameron County. The project includes construction of a gated weir across the river channel at River Mile 48.7, four miles southeast of the City of Brownsville, and operation of an in-channel reservoir extending approximately 42 miles along the Rio Grande. Impounded water would be confined within the existing stream banks. Potential environmental impacts of the project, discussed in Section 3.7, were evaluated in a Biological Opinion issued by the USFWS on May 14, 2003 (USFWS 2003b).

A number of new international bridge projects have been proposed for short or long-term implementation, including the Anzalduas-Reynosa, Bridge, Donna-Rio Bravo Bridge and the Port of Brownsville-Matamoros International Bridge. Bridge design requires USIBWC evaluation and authorization to ensure the structure does not interfere with the flood control function of the Lower Rio Grande FCP. Because these site-specific projects are not USIBWC initiatives, do not fall within the scope of the Programmatic EIS for improvements to the Rio Grande flood control projects.

1.6 SUMMARY COMPARISON OF POTENTIAL ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

A summary of potential consequences is presented in Table IV-1.2

Table IV-1.2 Summary of Environmental Consequences of Alternatives for Improvement of the Lower Rio Grande FCP

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Water Resources				
	Without levee system improvements, containment capacity may be insufficient to fully control severe floods.	Levee system improvements would increase flood containment capacity to control severe floods.	Implementation of water use and conservation measures such as irrigation best management practices would increase water delivery efficiency.	Cooperative agreements to control invasive species and improve wildlife habitat outside the ROW, and increase backwaters at the mouth of arroyos to increase aquatic habitat would not significantly affect water resources.
Biological Resources				
Vegetation	The levee slopes would continue to be mowed on an as-needed basis. Vegetation between river mile 28 and river mile 62.5 would continue to be cleared along the low water edge. The 33-foot wide vegetated wildlife corridor would be maintained.	Levee system improvements would remove vegetation on the levee slopes and at the toe of the levee. Non-native grasses would rapidly re-establish after the construction is complete.	Will include same effects as under EOM Alternative.	Development of parks and hike and bike trails would remove vegetation in limited areas.
Wildlife	The on-going mowing of the levee slopes and removal of vegetation would maintain this habitat as relatively low-quality for wildlife use, except as transit corridors.	Removal of non-native grasses on the levee sidewalls and within the expanded footprint would not affect wildlife, and the levee slopes would remain as relatively low-quality habitat for wildlife. Removal of vegetation considered high quality wildlife habitat (e.g., wetlands, thornscrub) would be minimized to the extent possible.	The effects on wildlife under the IWR Alternative would be as described for the EOM Alternative.	Regional cooperative wildlife conservation, in combination with regional vegetation management would provide additional breeding and foraging habitat for wildlife species, particularly birds.

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Threatened and Endangered Species	The on-going mowing of the levee slopes and removal of vegetation would maintain this habitat as relatively low-quality for wildlife use, except as transit corridors.	Removal of non-native vegetation along levee slopes would maintain the relatively low-quality habitat. If high-quality habitat at the toe of the levee was removed, it may remove suitable habitat for T&E species such as ocelot or jagarundi.	The effects on T&E species would be as described under the EOM Alternative.	Regional initiatives that preserve and improve foraging and breeding habitat would improve habitat for T&E species.
Aquatic Ecosystems	Ongoing removal of invasive aquatic plants and sediment would temporarily improve aquatic habitatsby improving flow regimes.	Removal of invasive aquatic plants would occur on an as-needed basis, with the same effects as the No Action Alternative..	The effects would be the same as under the No Action Alternative.	Regional cooperative initiatives to improve aquatic habitat include increasing backwaters at the mouth of arroyos, and watershed management to improve sediment control. Both regional initiatives would improve habitat for fish and other aquatic species.
Unique or Sensitive areas	No changes from current management practices would occur. Mowing the levee and vegetation removal would not affect unique or sensitive areas.	The effects would be the same as under the No Action Alternative.	The effects would be the same as under the No Action Alternative.	The effects would be the same as for the EOM and IWR Alternatives.
Wetlands	Mowing the levee and vegetation removal would not affect wetlands.	Levee footprint expansion may affect wetlands, but effects would be minimized to extent possible.	Under this alternative, no actions would be taken to improve wetlands. The effects on wetlands would be as under the EOM Alternative.	Under the MPM Alternative, no actions would be taken to improve wetlands, and wetlands would be affected as under the EOM and IWR Alternatives.
Land Use				
Residential Uses	Existing residential communities near the river corridor would not be impacted.	Floodway management changes would not impact residential uses.	Land use impacts would include those impacts described under the EOM Alternative.	Land use impacts would include those impacts described under the EOM Alternative.

	No Action Alternative	**Enhanced Operation and Management (EOM) Alternative**	**Integrated Water Resources Management (IWR) Alternative**	**Multipurpose Project Management (MPM) Alternative**
Agricultural Uses	Existing irrigated agricultural lands or rangelands would not be affected.	Floodway management changes would not impact agricultural or rangeland uses within the immediate vicinity.	Land use impacts would include those impacts described under the EOM Alternative.	Land use impacts would include those impacts described under the EOM Alternative.
Recreational Uses	Recreational uses, including the Bentsen-Rio Grande Valley State Park, adjoining federal land, and the Santa Ana National Wildlife Refuge would continue to provide recreational opportunities and would not be affected under the No Action Alternative.	Floodway management changes, including increased U.S. Border Patrol operations, would limit some recreational uses of the floodway.	Land use impacts would include those impacts described under the EOM Alternative.	Land use impacts would include those impacts described under the EOM Alternative. Cooperative agreements that promote watershed management and habitat conservation initiatives may change some land uses.
Other Uses	Manufacturing and industrial companies, including those at the Port of Brownsville, would not be affected.	Floodway management changes would not affect manufacturing and industrial companies.	Land use impacts would include those impacts described under the EOM Alternative.	Land use impacts would include those impacts described under the EOM Alternative.
Cultural Resources				
Historical Resources	There would be no adverse effects on the unknown number of historic structures.	Historic structures may be affected by physical changes in the levee configuration or increased levee height.	Historic structures may be affected by physical changes in the levee configuration or increased levee height. Historic resources may also be affected by changes in floodway and channel maintenance.	Historic structures may be affected by physical changes in the levee configuration or increased levee height. Historic resources may also be affected by changes in floodway and channel maintenance.
Archeological Resources	There are a total of at leas 262 cultural resources and 8 high probability areas for prehistoric sites, and none of these would be affected under the No Action Alternative.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height.	Archeological sites may be affected by physical changes in the levee configuration or increased levee height.

	No Action Alternative	Enhanced Operation and Management (EOM) Alternative	Integrated Water Resources Management (IWR) Alternative	Multipurpose Project Management (MPM) Alternative
Socioeconomic Resources				
Regional Economics	This alternative would not generate additional business sales, income or employment from construction. Current maintenance practices would continue to inject revenue in wages and expenditures into the regional economy every year.	Levee improvements would generate additional short-term mobs tha would last the duration of the project, but would not significantly impact regional economics.	Levee improvements would generate additional short-term mobs tha would last the duration of the project, but would not significantly impact regional economics.	Levee improvements would generate additional short-term mobs tha would last the duration of the project, but would not significantly impact regional economics.
Environmental Justice	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.	Disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.
Transportation	The transportation system would continue to provide access to residents and the Level of Service (LOS) would not be altered.	Construction activities would include the movement of heavy construction equipment to the site from larger metropolitan areas. During construction there would be a temporary increase in use of access roads to place equipment in staging areas. The roadways existing LOS would not be increased.	Traffic levels under the IWR Alternative would not vary from the traffic of the EOM Alternative, and LOS on affected roadways would not change.	Traffic levels under the MPM Alternative would not vary from the traffic of the EOM Alternative, and LOS on affected roadways would not change.

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Environmental Health				
Air Quality	Emissions generating activities would be the same as the current ongoing activities.	A slight increase in localized criteria air pollutants would occur during construction activities, but would occur only during construction activities. Regional air quality would not be affected.	Additional activities proposed under the IWR Alternative would not affect regional air quality.	Additional activities proposed under the MPM Alternative would not affect regional air quality.
Noise	The implementation of existing plans to develop parks, nature trails, and recreational areas would likely temporarily increase noise levels, as they would most likely entail the use of construction vehicles and equipment, but would last only as long as the construction.	Similar to the No Action Alternative. Noise from additional construction activities would be intermittent and short-term in duration.	The IWR Alternative would not produce additional noise sources than construction activities, and therefore, the IWR Alternative would not affect noise values.	The MPM Alternative would not produce additional noise sources than construction activities, and therefore, the IWR Alternative would not affect noise values.
Public Health and Environmental Hazards	No impacts are anticipated as the current levee configuration would be retained.	Improvements to the levee would not impact waste storage and disposal sites.	The IWR Alternative would not impact hazardous materials usage and waste sites.	The MPM Alternative would not impact hazardous materials usage and waste sites.

SECTION 2
AFFECTED ENVIRONMENT

This section describes resources in the potential area of influence of the Lower Rio Grande FCP. Environmental conditions along the potential area of influence of the Lower Rio Grande FCP have been described in detail in the following three documents which are incorporated herein by reference, as allowed by 40 CFR 1508.02:

- *Final Environmental Impact Statement Alternative Vegetation Management Practices for the Lower Rio Grande Flood Control Project Cameron, Hidalgo, and Willacy Counties, Texas* (USIBWC 2003).
- *Final Environmental Impact Statement, El Paso-Las Cruces Regional Sustainable Water Project* (USIBWC and El Paso Water Utilities/PSB 2000).
- *Final Programmatic Environmental Impact Statement for JTF-6 Activities Along the U.S./Mexico Border* (USACE 1994), *Supplemental Programmatic Environmental Impact Statement for INS and JTF-6 Activities* (USACE 2001).

The data presented in these documents are on a county-level basis and by physiographic province. These discussions are paraphrases of the detailed descriptions provide in the documents mentioned above. They are presented herein merely to acquaint the reader with the project area. If additional information is necessary, the reader should refer to the environmental baseline documents. Baseline conditions are discussed in Sections 2 and 3 as follows:

- Water resources;
- Biological resources;
- Cultural resources;
- Land use;
- Socioeconomics resources and transportation; and
- Environmental health.

2.1 WATER RESOURCES

2.1.1 Flood Control

The Lower Rio Grande FCP consists of the river channel, flood levees in each country, two diversion dams, and off-river floodways in Mexico and the United States. Other components of the project include irrigation weirs, pump intakes, highway and railroad bridges, river gauges, and farm levees. Some river straightening took place between 1976 an 1977 on a 9,000-foot length of river upstream of Hidalgo and Reynosa.

The depth of the river channel varies from 1 to 15 feet. A total of 270 miles of levees have been built on the United States portion of the project: 102 miles along the Rio Grande, and 168 miles in the off-stream floodways system. The off-river levees have an average height of

about 15 feet. The on- and off-river levees have an average base width of 90 to 120 feet, and an average crown width of 14 to 16 feet. Levee separation is between 600 feet to 1 mile.

The two diversion dams, Anzalduas and Retamal, were constructed with the objective of diverting flood flows in the off-river floodway systems of the United States and Mexico, respectively. Two diversion dams, Anzalduas Dam and Retamal Dam, are jointly operated by the USIBWC and MxIBWC. The interior floodway system in the United States has a total area of 27,013 acres between the levees in Hidalgo, Cameron, and Willacy Counties.

The Lower Rio Grande FCP contains a variety of features for protection of the Lower Rio Grande Valley of Texas, including the Rio Grande main stem, an Interior Floodway System, and the Anzalduas and Retamal Diversion Dams. The United States portion of the Lower Rio Grande FCP is operated to convey excess floodwaters of the Rio Grande Valley to the Gulf of Mexico through the river and United States interior floodways. Anzalduas Dam is operated to divert water as required by the Treaty of February 3, 1944, "Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande" (TS994; 59 Stat. 1219). Flood operations of the Lower Rio Grande FCP also involve close coordination of the USIBWC and MxIBWC in the operation of two upstream reservoirs (Amistad and Falcon) to control floodwaters reaching the Lower Rio Grande FCP area. The two Sections work closely on the division of excess floodwaters diverted into each country's interior floodway systems.

Normal operation of the Lower Rio Grande FCP includes the daily operation of the Anzalduas Dam for diversion of Mexican waters and frequent inspection of the entire Lower Rio Grande FCP area to ensure flood readiness. Retamal Diversion Dam is not a daily operational structure and is only operated in the event floodwaters need to be diverted to the Mexican interior floodway. Anzalduas Dam is used for daily diversion of waters to Mexico as well as to divert floodwaters to the United States interior floodway. The last time the flood control gates at Retamal Diversion Dam were used to divert flood waters was during the 2005 flood as a result of Hurricane Emily.

The design flood for the Lower Rio Grande FCP is an approximate 100-year flood, with a flow of 250,000 cfs at Rio Grande City. During the design flood, both Anzalduas Dam and Retamal Dam will divert 105,000 cfs into the United States and Mexico, respectively. Flow diversion during the design flood will limit flood flows through the Brownsville-Matamoros area to 20,000 cfs.

Anzalduas Dam diverts floodwaters to the interior floodway system, located in Hidalgo, Cameron, and Willacy counties. This system allows for the passage of 105,000 cfs in the Main Floodway, 84,000 cfs in the North Floodway, and 21,000 cfs in the Arroyo Colorado. With the exception of one area in Arroyo Colorado and two areas in the North Floodway, the Off-River Floodway System passes the design flood flows with a minimum of two feet freeboard.

2.1.2 Hydrology

The flow of the Rio Grande is highly variable and tightly managed. In the Lower Rio Grande FCP and surrounding areas, flow is dictated by the needs of agriculture and crop watering schedules. September to February is the period with the lowest flow.

The other major items that affect flow in the Lower Rio Grande FCP area are water storage and storms. There are two large reservoirs on the lower Rio Grande, International Amistad Reservoir, near Del Rio, Texas and International Falcon Reservoir, near Laredo, Texas. These reservoirs store water for public water supply, recreational activities as well as holding stormwater surges. There are approximately 500 irrigation and drainage structures that regulate flow and 270 miles of levees to manage stormwater and channel flow into and out of diversions and floodways.

River elevation is influenced by upstream dams and fluctuates due to irrigation deliveries, withdrawals, and flood events. A number of variables influence river elevation such as flow rates, aquatic vegetation, and channel configurations.

Flows reaching the Lower Rio Grande FCP are mainly controlled by operation of the bi-national Falcon Dam and subsequent return irrigation flows. Baseflow decreases along the project as irrigation water is withdrawn for agriculture. The downstream end of the Lower Rio Grande FCP, below Brownsville, has a minimum baseflow that often causes water ponding and, in recent years, closure of the river mouth into the Gulf of Mexico.

2.1.3 Water Supply and Water Management

Unlike elsewhere in Texas where water is a flow resource, surface water in the Rio Grande below Amistad is a stock resource meaning that water accumulates in Amistad and Falcon reservoirs and is released on demand. Amistad and Falcon reservoirs are considered one system with water frequently released from the upstream Amistad dam to replenish Falcon reservoir and meet the demands in the LRGV. The Rio Grande Watermaster is the authorized agent allowed to request releases of U.S. water held in storage at both reservoirs (USIBWC 2003a).

Water rights and distribution in the Rio Grande are based on two factors: 1) the maximum volume assigned by law to each water right holder, by use; and 2) priority of the use. All water right have a maximum annual allowable, but because the total legal demand for water always exceeds the supply, only the highest priority uses receive the full amount of their water right. The following are the weighted priorities; 1) domestic municipal and industrial uses (highest priority), 2) operational, and 3) carry over balances for irrigation water accounts. In order to provide for and protect this municipal based priority system the watermaster divides all U.S. waters held in storage Amistad/Falcon into three distinct pools. This highest priority pool is the water reserved for all municipal uses. It is reestablished monthly to cover roughly average municipal diversions for one year (225,000 ac-feet). The second highest priority pool, reestablished monthly, is water held in reserve (75,000 ac-feet) to cover system losses and ensure conveyance of water even in periods of low flow and drought. The lowest priority pool is reserved for agricultural interests and consists of leftover water after the Municipal and Operating pools have been reestablished. This irrigation water pool consists of leftover irrigation storage that has not been used and new net inflows. This priority-based system also mandates that municipal water be treated differently from irrigation in the allocation process. At the beginning of the calendar year, each municipal water right holder's account is replenished to its full amount. No leftover water is rolled over to the new year. Agricultural

accounts on the other hand are replenished only when monthly inflows are in excess of losses and the water needed to reestablish the Municipal and Operating reserves (USIBWC 2003a).

2.1.4 Groundwater Resources

The Gulf Coast Aquifer is the major aquifer within the LRGV, ranging in age from the Miocene to Recent. The system underlies an area extending from Mexico to Louisiana, approximately 100 miles inland from the coastline. The Gulf Coast Aquifer consists of intermingled beds of sand, silt, clay and gravel and includes the Chicot, Evangeline, and the Jasper aquifer. Large withdrawals for irrigation, public supply, and industrial uses have resulted in saltwater encroachment in some coastal areas. Dissolved solids typically range from 300 to 1,000 mg/L (USIBWC 2003b).

2.1.5 Agricultural Water Use

Approximately 34,277 acres of agricultural land lie in the project area along the Rio Grande in Cameron and Hidalgo counties. Though land is not cultivated immediately along the riverbanks, agricultural land predominates within the floodplain inside the USIBWC levees. In 1997, Cameron County had a reported 902 farms, comprising 368,528 acres while Hidalgo County had 1,373 farms consisting of 635,884 acres.

The major use of Rio Grande water in the LRGV is for irrigation purposes, followed by municipal uses. Agricultural water use for Cameron County ranged from a low of 253,613 ac-ft in 1993 to a high of 439,846 ac-ft in 1995. Agricultural water use for Hidalgo County ranged from a low of 298,267 ac-ft in 1997 to a high of 941,121 ac-ft in 1994 (USIBWC 2003b).

2.1.6 Water Quality

The Lower Rio Grande FCP is located within water quality management Segments 2302 and 2301 of the Rio Grande, as defined by the Texas Commission on Environmental Quality (TCEQ). Segment 2302 is designated for high aquatic life use, contact recreation, general use, fish consumption, and public water supply. However, a portion of this segment is impaired for contact recreation due to high bacteria levels from the Pharr International Bridge to downstream of the Santa Ana National Wildlife Refuge.

TCEQ is the regulatory body in the state of Texas in charge of the designation of surface water uses. The TCEQ Surface Water Quality Monitoring Program recognizes the geologic and hydrologic diversity of the state by dividing major river basins, reservoirs, bays, and estuaries into defined segments (referred to as classified segments). Segment 2301 is designated as “Rio Grande Tidal,” extending upriver from the mouth of the river at the Gulf of Mexico, to a point 6.7 miles downstream of the International Bridge at Brownsville, Texas. This segment is characterized as a narrow and flat watershed that extends only a few miles inland on either side of the river. Segment 2302, designated as “Rio Grande Below Falcon Reservoir,” extends 231 miles from a point 6.7 miles downstream of the International Bridge at Brownsville, Texas, to Falcon Dam in Starr County. Flow from the upstream main stem to this segment is regulated by releases from the International Falcon Reservoir (TNRCC 2001).

TCEQ sets numerical water quality criteria to ensure protection for the assigned uses. The Texas Surface Water Quality Standards (Texas Administrative Code [TAC] 307.1-307.10; TNRCC 2001) contain general standards that apply to all surface waters in the state. Also, segment-specific standards identify appropriate uses (aquatic life, contact or non-contact recreation, drinking water, *etc*.) and determine the degree of support (fully, partially, or non-supporting) for these uses. The standards designate upper and lower limits for common indicators (criteria) of water quality, such as dissolved oxygen, temperature, pH, dissolved minerals, and fecal coliform bacteria. Criteria and control procedures are established for specific toxic substances and total toxicity.

The TCEQ Surface Water Quality Monitoring Program and the USGS National Stream Quality Accounting Network (NASQAN) program collect surface water quality data from a series of monitoring stations. There is one monitoring station for Segment 2301 and 12 monitoring stations for Segment 2302.

According to the most recent draft, 2002 State of Texas Water Quality Inventory for the Rio Grande Basin, Segment 2301 is characterized by excessive algal growth. Chlorophyll a levels were elevated in one-third of the samples taken 25 miles upstream of State Highway 4. Other water quality standards, including pH, water temperature, dissolved oxygen and fecal coliform, are fully supported. The segment's designation for overall aquatic life use is also fully supported (TNRCC 2001).

Concerns within Segment 2302 include elevated nutrient enrichment, particularly total phosphorus, from samples taken 2.5 miles downstream of Falcon Dam to Fronton. Public water supply concerns are an issue from Pharr International Bridge to downstream of the Santa Ana Wildlife Refuge. Excessive chloride, sulfate, and total dissolved solids were found in samples taken along this stretch of the segment. Other water quality standards, including pH, water temperature, dissolved oxygen and fecal coliform, are fully supported along Segment 2302. The segment's designation for overall aquatic life use and recreational use is also fully supported (TNRCC 2001).

Regionally, water quality has been a concern for a number of years. In 1992, a binational and multi-agency effort, composed of representatives from TCEQ, USEPA – Region 6, USIBWC, MxIBWC, and the Mexico National Water Commission, was initiated to characterize the extent of toxic contamination of the Rio Grande/Rio Bravo and its tributaries along the international reach. The Binational Toxic Substances Study was conducted from the New Mexico/Texas/Chihuahua border (El Paso/Ciudad Juarez area) to the Gulf of Mexico (Brownsville/Matamoros area). Contaminants measured in this two-phased study included arsenic, chromium, copper, nickel, lead, silver, zinc, Aroclor 1260 (PCB), and chlordane. Only chromium, nickel, and arsenic were identified as a concern.

2.2 BIOLOGICAL RESOURCES

Biological resources have been described in *Biological Resources Survey, Rio Grande and Tijuana River Flood Control Projects, Mew Mexico, Texas and California, Final Report* (CDM 2005); *Final Environmental Impact Statement Alternative Vegetation Management Practices for the Lower Rio Grande Flood Control Project, Cameron, Hidalgo, and Willacy*

Counties, Texas (USIBWC 2003), and *Environmental Baseline, Texas Land Border, Volume Two* (USACE 1994). Information from these documents is incorporated by reference. The Lower Rio Grande Project is located in Hidalgo, Cameron and Willacy Counties, Texas.

2.2.1 Vegetation

The LRGV is within the Matamoran District of the Tamaulipan Biotic Province. The Tamaulipan region of southern Texas and northeastern Mexico is in a sub-tropical area where warm average temperatures and multiple vegetation communities provide habitat for a very diverse flora and fauna. The elevation of the LRGV ranges from sea level to 1,000 feet above sea level. The LRGV receives between 16 and 35 inches of annual rainfall, with increasing rainfall from west to east.

The shallow soil depth, rapid drainage, and clay loam soils support thorny brush which is the predominant vegetation in this region. A few species of plants account for most of the brush vegetation, including mesquite, various species of acacia, desert hackberry, javelina–brush, cenizo, common bee-brush, Texas prickly pear, and tasajillo or desert Christmas cactus. Parts of the region support grasslands of very diverse composition due to the highly variable soil and moisture conditions, while lines of riparian vegetation are present within the few river valleys (World Wildlife Fund 2001). Grassland vegetation was somewhat more extensive prior to the 19th century, but continuous grazing and other factors have altered the plant communities (USIBWC 2003b).

As a result of the clearing of native brush for agriculture, relatively small remnant plots of native brush remain. The predominant vegetation in the LRGV at this time consists mainly of agricultural crops such as cotton, grain sorghum, corn, sugarcane, citrus, and vegetables. The native brush throughout the project area is confined to small parcels between agricultural fields and narrow strips along the Rio Grande. Larger tracts of native brush can be found in areas such as the Santa Ana National Wildlife Refuge, the Bentsen-Rio Grande Valley State Park, and tracts of the Lower Rio Grande Valley National Wildlife Refuge.

The levees that were installed to provide flood protection are raised trapezoidal compacted-earth structures, with a crown width of 16 feet, a typical height ranging from 6 to 10 feet, and an approximate 3:1 side slope ratio (units of horizontal run in feet per foot of vertical rise). The levee slopes are grass-covered, and dominated by Bufflegrass and sand dropseed. The levee slopes are frequently mowed to prevent the encroachment of woody plants on the levee slopes, and vegetation is often removed for USBP operations.

Two diversion dams (Anzalduas and Retamal) divert flood flows in the off-river interior floodway systems in the United States and Mexico. Vegetation is cleared from the edge of the low water to a distance of 75 feet between river mile 28 and river mile 62.5. In addition, a 33-foot wide vegetation wildlife corridor is maintained to provide for habitat preservation for wildlife and endangered species such as jaguarondi and ocelots.

2.2.2 Wildlife

A number of wildlife species are present in the region. Common LRGV wildlife species include white-tailed deer, turkey, javelina, bobwhite quail, scaled quail, white-winged dove, mourning dove, cottontail rabbit, jackrabbit, waterfowl, and a variety of nongame birds. The region also provides important wintering habitat for thousands of migratory birds, including many species of passerines, raptors, sandhill cranes, ducks, and geese. In addition to the more common wildlife species, a number of unique and rare animals occur in the region (World Wildlife Fund 2001), and some are limited in their distribution either partially or entirely to the Tamaulipan Biotic Province.

There are approximately 67 mammals that may potentially occur within the project area, including species of primary concern, such as the jaguarundi and ocelot. The mammals are dominated by rodents (24 species) and bats (13 species). Some common mammals which may be encountered in the LRGV are the common raccoon, striped skunk, coyote, Mexican ground squirrel, bobcat, beaver, and nutria (USIBWC 2003b).

There are approximately 500 species of birds that may potentially occur within the project area. The bird species are dominated by wood warblers (44 species), geese and ducks (30 species), sparrows and towhees (26 species), raptors (25 species), and tyrant flycatchers (25 species). Some of these species nest in the project area, but most of the 484 species are only seen during spring and fall migration. Many species pass through the LRGV on their way to summer breeding or wintering grounds because of the convergence of two major migratory flyways, the Central and Mississippi flyways. The LRGV is the point where many tropical birds reach their northernmost ranges (Fermata 2003).

Amphibians and reptiles are also well-represented in the LRGV, with approximately 80 species of reptiles and amphibians that potentially occur in the LRGV. There are approximately 31 species of snakes, including water snakes, rat snakes, and two venomous snakes, the western diamondback rattlesnake and the Texas coral snake. There are approximately 20 species of lizards present in the LRGV, including whiptails, skinks, Mediterranean gecko, and the green anole. There are approximately six turtle species, including the red-eared slider, Texas spiny soft-shelled turtle, ornate box turtle, Texas tortoise, and the yellow mud turtle. One crocodilian specie, the American alligator is present in the area. At least 18 species of anurans (frogs and toads) are found in some part of the project area, including several species of true toads and true frogs. Four species of salamanders, including the endemic black-spotted newt, are likely to be present in the LRGV.

2.2.3 Threatened and Endangered Species

Within the LRGV, there are several species listed as federally threatened or endangered, and several additional species which are listed as threatened or endangered by the State of Texas (TPWD, 2006). The project area is within Hidalgo, Cameron, and Willacey Counties. Within these counties, there are several federal and state listed T&E species, as follows:

- 5 species of amphibians;
- 20 species of birds;

- 4 species of fish (one of which is probably extirpated);
- 7 species of mammals (one of which is probably extirpated);
- 1 species of mollusk;
- 13 species of reptiles, and;
- 4 species of plants.

See Appendix B for additional details about the T&E species within these counties.

2.2.4 Aquatic Ecosystems

There are several distinct aquatic communities within the LRGV, and include the Rio Grande, resacas (abandoned river channels), arroyos, reservoirs, ponds, irrigation ditches, and other manmade impoundments. In lotic communities (moving waters like the Rio Grande), habitats are most often characterized by sandy or clayey bottoms that have been somewhat scoured. Available nutrients are provided by accumulation of woody debris and leaf litter. These components also serve as areas of refuge and forage for macroinvertebrates and larger vertebrate species such as fish. Areas of slower moving water may exhibit these qualities, in addition to the presence of muddy substrates that serve as habitat for burrowing species. These species are often an important food source for higher trophic levels. Lentic communities are typically contained aquatic environments like resacas, lakes and ponds. Substrates within these communities vary according to geomorphology. Sandy or rocky substrates may have existed, but most often thick layers of organic and inorganic deposition cover these substrates.

In both lotic and lentic communities, phytoplankton is the major source of primary production and nutrients in the food chain. These microscopic algal forms are suspended in the water column, and use photosynthesis to acquire energy. Similarly, in both lotic and lentic environments, zooplankton is an important part of the food chain. These organisms feed on phytoplankton, bacteria, protozoa, detritus, and other zooplankton and are, in turn, preyed upon by members of higher trophic levels. Benthic macroinvertebrates include insects (larval forms), worms, mussels, and crustaceans (shrimp, crawfish, *etc*.). The greatest diversity of macroinvertebrates in lotic communities is in areas with a rocky substrate and moderate water velocity. In lentic communities, the highest diversity of macroinvertebrates is along shallow, vegetated shorelines.

Fish are the most prominent member of the higher trophic levels, and approximately 178 species may occur within the LRGV. The freshwater fauna most likely consists of smaller forage fish populations including the red shiner, inland silverside, Tamaulipas shiner, mosquitofish, sailfin molly, gizzard shad, and threadfin shad. Larger forage fish include carp, buffalo, striped mullet, catfishes, and sunfishes. The dominant numbers of fish are represented by the sunfishes (10 species), carps and minnows (nine species), and the drums (eight species). In addition to these species, there are several important recreational species, including the warmouth, bluegill, largemouth bass, white crappie, and two species of catfish, channel catfish and the flathead catfish.

The fish of the lower Rio Grande have not been extensively studied (Edwards and Contreras-Balderas 1991). However, the fish of the Rio Grande can be separated into two indigenous groups: one is upstream and composed of freshwater species, and the other is downstream and composed of upstream species as well as estuarine and marine species. Although geology and climate primarily have determined these distribution patterns, recent studies of the river indicate that major changes in these two groups have occurred. The upstream fauna has lost many of its native freshwater species to exotic and estuarine species. The downstream fish populations have shown a decrease in diversity, primarily due to decreasing stream flows, increased pollution, and an increase in exotic species (Edwards and Contreras-Balderas 1991), primarily water hyacinth and hydrilla.

2.2.5 Unique or Sensitive Areas

Numerous unique or sensitive areas exist in the project area because of the convergence of subtropic, temperate, coastal, and desert influences all occurring in the southernmost tip of Texas, including lands managed by USFWS, generally identified as National Wildlife Refuges (NWRs), and lands managed by TPWD that include state parks and Wildlife Management Areas (WMA). Other unique or sensitive areas including wetlands and other hydrological features in the project area are critical for the fish and wildlife living within them. This section describes the major unique or sensitive areas existing in the project area. An inventory of natural resources management areas in the lower Lower Rio Grande FCP area is provided in the EIS prepared by the USIBWC for alternative vegetation management practices for the Lower Rio Grande FCP, along with location maps (USIBWC 2003).

The Lower Rio Grande Valley is a culturally and ecologically important and diverse corridor. A binational planning effort, the Caminos del Rio Heritage project, is now underway to conserve the unique natural and cultural heritage along the Rio Grande, from the Laredo/Colombia area to the Gulf of Mexico. With technical assistance from the National Park Service, this "heritage corridor" preservation effort includes two national parks, 196 properties listed on the NRHP, four state parks, and the Lower Rio Grande Valley NWR (American Rivers 1993).

Lower Rio Grande Valley National Wildlife Refuge

Lower Rio Grande Valley NWR is one of the most biologically diverse national wildlife refuges in the continental United States. Habitat types include chaparral, subtropical gallery forests, salt lakes, palm forests, tidal flats, salt marshes, sand dunes, Bordas Escarpment, savannas, and other unique habitats. The tracts of the Lower Rio Grande Valley NWR that have been or will be acquired will provide wildlife areas, providing corridors for wildlife species migrating north and south. Descriptions of Lower Rio Grande Valley NWR units, along with location maps, are provided in the EIS prepared by the USIBWC for alternative vegetation management practices for the Lower Rio Grande FCP (USIBWC 2003)

Santa Ana National Wildlife Refuge

The Santa Ana NWR is located adjacent to the Rio Grande in Hidalgo County and is contained entirely within Lower Rio Grande FCP levee system. This 2,000-acre refuge

provides thorn forest habitat for a variety of wildlife, including approximately 300 bird species and several threatened or endangered reptiles and amphibians, including the Mexican tree frog, sheep frog, Texas tortoise, Texas horned lizard, black-striped snake, and the Texas indigo snake. Other protected species that may potentially occur within the Santa Ana NWR include the black-spotted newt, Rio Grande lesser siren, and speckled racer. Threatened and endangered mammals and birds that may occur in the Santa Ana NWR include ocelot, jaguarundi, brown pelican, and peregrine falcon. Approximately one half of all butterfly species found in North America may occur in the Santa Ana NWR.

Bentsen-Rio Grande State Park

Bentsen-Rio Grande Valley State Park located in Hidalgo County along the Rio Grande contains approximately 588 acres of subtropical resaca woodlands and thicket brush land. The State Park is located entirely within the USIBWC levee system. The plants and animals of Bentsen-Rio Grande Valley State Park represent a northernmost extension of the subtropics. Unusual birds that can be seen in the park include the pauraque, red-billed pigeon, green kingfisher, black-bellied whistling duck, clay colored robin, rose-throated becard, and tropical parula. Other popular species that can be observed at the park include the green jay, blue bunting, groove-billed ani, vermilion flycatcher, ringed kingfisher, buff-bellied hummingbird, and Altamira oriole.

Las Palomas Wildlife Management Area

Las Palomas WMA encompasses 7,686 acres within Cameron, Hidalgo, Starr, Willacy, and Presidio counties. The Las Palomas consists of several segregated tracts, of which five are contained within the Lower Rio Grande FCP levee system. These five tracts contain about 864 acres. The Las Palomas WMA consists of native brush vegetation with some farmland and wetlands. The area is managed by the TPWD primarily for white winged doves, but it also supports black-bellied whistling ducks, chachalacas, morning doves, and scaled quail. Descriptions of Las Palomas WMA units, along with location maps, are provided in the EIS prepared by the USIBWC for alternative vegetation management practices for the Lower Rio Grande FCP (USIBWC 2003).

Sabal Palm Grove Sanctuary

The Sabal Palm Grove Sanctuary, located along the Rio Grande southeast of Brownsville, was acquired by the National Audubon Society to preserve the native habitat of the border region. The sanctuary consists of 172 acres of the largest and best-preserved remnant of Texas sabal palm forest in the United States. The sanctuary, which is located totally within the USIBWC levee system, has been working with the communities of the LRGV and municipalities in Mexico to strengthen environmental education and examine the local dimensions of population growth and environmental preservation. The Sabal Palm Grove Sanctuary staff has been active in the pursuit of strategies to ensure long term protection of local natural resources by building relationships with local community leaders on both sides of the border.

2.2.6 Wetlands

Wetlands have been identified as being of particular concern because they perform valuable functions in restoring and maintaining the quality of the nation's waters. These functions include flood water storage, sediment trapping, nutrient removal, chemical detoxification, shoreline stabilization, aquatic food chain support, fish and wildlife habitat, and groundwater recharge. In Texas, wetlands are among the most valuable resources. Additionally, these communities provide many economic and ecological benefits, hunting, fishing, and bird watching opportunities (TPWD 1997). Although wetlands comprise less than 5 percent of its total land area, Texas has the fourth greatest wetland acreage in the lower forty-eight states following Florida, Louisiana, and Minnesota (Dahl 1990).

Diverse wetland types provide habitat for many plant and animal species. Most freshwater fish depend on wetlands for food, spawning, and nursery grounds (Tiner 1984). Texas wetland ecosystems are extremely important to wildlife since the state is one of the most important wintering areas for waterfowl in North America (Stutzenbaker and Weller 1989). Waterfowl utilize wetland plants and animals for food while over-wintering or during migration stopovers. Wetlands are also important breeding areas, and they provide cover for nesting waterfowl and other birds (TPWD 1997).

The USFWS has estimated that from the 1780s to the 1980s, wetland acreage in Texas decreased by 52 percent from about 16 million to about 7.6 million acres (Dahl 1990). Wetlands of every type have been affected. Some of these losses can be attributed to natural causes, but large percentages of the losses were caused by human activities. In rural areas, losses can be attributed to conversion to cropland, declining water levels due to pumping for irrigation, and overgrazing of wetland vegetation by livestock, which can increase erosion and evaporation. In urban areas, wetland losses occur due to encroachment by residential and commercial construction and industrial development. Other activities that can cause wetland losses are filling, water diversion, drainage and river channelization, clear-cutting, burning, lowering or disturbing the shallow water table, and the construction of dams, reservoirs, flood-control ditches, levees, irrigation canals, and barge and ship canals. Wetland degradation also has resulted from the discharge of inadequately treated sewage and industrial waste into wetlands (TPWD 1997).

Some land use practices have led to the creation of new wetlands or the enlargement of existing wetlands, for example the Rio Bosque wetlands described above. However, those gains have not offset the losses of natural wetland acreage, function, and value that have occurred in the state.

The wetlands once present along the Rio Grande have been altered due to water control projects and the clearing of native vegetation. Although the wetlands in the Rio Grande Valley have been altered, various sizes and types of wetlands exist throughout the project area. Wetlands in the project area can be classified into four separate systems: estuarine, lacustrine, palustrine, and riverine, as described below. In addition to these wetlands, there are other man-made waters such as settling basins, ditches, canals, reservoirs, and man-made lakes throughout the project area. These man-made waters are primarily designed for flood control and irrigation purposes; however, these structures are often lined with dense vegetation that supports wildlife and serve as travel corridors for many species.

Estuarine systems are tidal wetlands and adjacent deepwater tidal habitats that are occasionally diluted by freshwater runoff from the land. Estuarine wetlands do not occur within the project area, but do exist downstream near the Gulf coast. These systems are associated with sources of saltwater such as the Brownsville Ship Channel.

Lacustrine systems are composed of deepwater habitats and associated wetlands situated in topographic depressions or dammed river channels. Lacustrine wetlands are common in the project area and are associated with the open water of resacas, ponds, lakes, reservoirs, and settling basins. Resacas are old, abandoned river channels that measure from one to six feet deep and 30 to 150 ft wide. Resacas may hold water forming an oxbow lake or only hold water for part of the year. Cattails and willows often dominate the resacas. Resacas provide water for irrigation and support numerous wildlife species. The wildlife and human uses of resacas are dependent on the water quality and the permanency of the water. Very little is known about the water quality of resacas, but some may have decreased water quality due to agricultural runoff and release of sewage during flood events. Siltation has become a major problem within resacas due to the absence of scouring and the increase in urban runoff, shoreline erosion, and general degradation of water quality (Ramirez 1986).

Palustrine systems are all nontidal wetlands dominated by trees, shrubs, and other vegetation. Palustrine systems constitute the majority of wetlands in the project area and are commonly found around resacas and riparian habitat along the Rio Grande. Palustrine wetlands can be found at Bentsen-Rio Grande Valley State Park and Santa Ana NWR.

Riverine systems are all wetlands and deepwater habitats within a river channel. The Rio Grande is the dominant riverine system in the project area. Small riverine systems associated with canals and ditches also exist in the project area.

2.3 CULTURAL RESOURCES

A thorough description of the environmental setting and cultural overview has been provided in previous environmental documentation prepared for the USIBWC in support of the EIS for vegetation manegement alternatives of the LRGFCP (Cooper, *et al.* 2002), and this PEIS (GeoMarine 2005). Cultural resources data for the river floodway of the Lower Rio Grande FCP area have been identified using these documents, with emphasis on the data contained within those two reports.

Cultural resources in the Lower Rio Grande Flood Control Project are defined as historic properties that are archeological sites or historic structures. In several cases, archeological sites may also contain historic structures. Archeological sites in the project area range in date from the Late Prehistoric period (A.D. 800 to 1519 [GeoMarine 2005]) to the historic period. Historic structures are defined as those that were constructed 50 or more years ago. For these cultural resource types, the project area encompasses all areas that could be directly affected by the project or areas where the project could result in indirect effects to cultural resources.

In the Lower Rio Grande Flood Control project area, previous cultural resources studies have been carried out along the river floodway from Peñitas and the off-river floodway system under USIBWC control. These cultural resource studies are documented by Cooper, *et al.* (2002), and the update of this document in support of this PEIS preparation (GeoMarine 2005).

Additional information for specific levee segments of the Lower Rio Grande FCP was provided in Environmental Assesments recently prepared by the USIBWC (2005, 2006b and 2007). The Cooper, *et al*. (2002) study covers the entire reach of the Lower Rio Grande FCP area, while the GeoMarine (2005) study includes not only this flood control project but also the Presidio FCP and Rectification FCP.

The Cooper, *et al.* (2002) study compiled previously recorded site data from the TARL, other agencies, and other cultural resources reports and involved a reconnaissance survey of the area between the center line of the Rio Grande to United States government project levee along the river floodway from Peñitas to river mile 39 and the off-river floodway system under USIBWC control (Cooper, *et al*. 2002). The results of these studies identified 248 cultural properties or districts. Eleven properties are known prehistoric sites, five are multicomponent site locations (prehistoric and historic), two are prehistoric burials of unknown age, 13 are NRHP/RHTL properties or districts, 44 are historic sites, one is a known remnant river vessel, three are potential boat wreck sites, two are potential prehistoric sites, and 167 are potential historic sites. Within the Lower Rio Grande FCP area, Cooper, *et al.* reported that 47 percent of known prehistoric sites identified in the report are associated with arroyo or natural drainage edges, 20 percent are associated with hills or ridges, 20 percent are associated with bancos or other fluvial features, and 13 percent are found in featureless areas (Cooper, *et al.* 2002).

An update of the Cooper, *et al.* report (2002) was commissioned by the USIBWC in support of the PEIS preparation (GeoMarine 2005) for the river reach of the Lower Rio Grande FCP area between Peñitas and the mouth of the Rio Grande, and extending one-half mile north of the Rio Grande. This update document identified 68 cultural resources, 20 in Hidalgo County, and 48 are located in Cameron County. Three of the 68 sites are prehistoric, 65 are historic (including historic archeological sites and standing structures; some archeological sites also contain standing structures), one is multicomponent (prehistoric and historic), and two have an unknown temporal component. Of those identified, 16 are eligible for the NRHP or are historic districts associated with Cameron County (GeoMarine 2005).

Within the Lower Rio Grande FCP, between Peñitas and the mouth of the Rio Grande, the updated 2005 evaluation, 100 percent of the previously recorded temporal components are within the floodplain, 100 percent are within the prehistoric floodplain, zero percent are within the prehistoric terrace/fan, 100 percent are within the historic floodplain, and zero percent are within the historic terrace/fan (GeoMarine 2005).

An update of the Cooper, *et al*. report (2002) was conducted for USIBWC improvements for three segmments of the Lower Rio Grande FCP, within one-half mile of the existing levee: the Hidalgo Protective Levee System (USIBWC 2005a), Mission and Common Levee systems USIBWC 2006b) and Lateral A/Retamal Dike Levee Systems (USIBWC 2007). Improvements to additional levee segments of the Lower Rio Grande FCP (the river segment between Donna and Brownsville and the Main and North Floodways), the USIBWC is currently preparing environmental assessments, including updates of the Cooper, *et al*. (2002) cultural resources report.

For the study Hidalgo Protective Levee System, the USIBWC (2005a) evalaution confirmed Cooper, *et al.* (2002) findings, and three additional historic structures were identified through a literature review and reconnaissance survey of the project area (USIBWC 2005a).

The environmental evaluation of the Mission and Common Levee systems also confirmed Cooper, *et al.* (2002) findings, and identified four historic archeological sites and five major engineering structures were identified through a literature review and reconnaissance survey of the project area (USIBWC 2006b). For the the Lateral A/Retamal Dike Levee System, seven additional historic sites, eight prehistoric high-probability areas, 12 historic structures, and three cemeteries (Cooper, *et al*. 2002; USIBWC 2007).

2.3.1 Historical Resources

The total number of historic structures within the Lower Rio Grande FCP area is not known, as a total has not been expressed in prior literature. It is known that several standing structures may be located within archeological site boundaries. Thirteen properties or historic districts are listed in or are eligible for the NRHP (Cooper et al. 2002:93). Information specific to some of the historic structures and sites can be found in the Cooper et al. (2002), GeoMarine (2005), and USIBWC (2005a, 2006b, 2007) reports.

2.3.2 Archeological Resources

Within the Lower Rio Grande FCP area, 262 cultural resources (including the 13 NRHP sites listed above) and eight high-probability areas for prehistoric site potential have been identified (Cooper, *et al.* 2002; USIBWC 2005a, 2006b, 2007). Fifteen of these are prehistoric sites, areas of potential sites, and/or burials (Cooper, *et al.* 2002:93), five are multicomponent (prehistoric and historic) (Cooper et al. 2002:93), 225 are historic and may also contain standing structures (Cooper, *et al.* 2002:93; Parsons 2005a; Parsons 2006b; Parsons 2007), one site is a known remnant river vessel (Cooper, *et al.* 2002), and three are potential boat wreck sites (Cooper, *et al.* 2002). Information specific to these archeological sites can be found in the Cooper, *et al.* (2002), GeoMarine (2005), Parsons (2005a, 2006b, 2007) reports.

2.4 LAND USE

This section characterizes land uses in the immediate and general vicinity where project facilities would be located or where those facilities could cause impacts. This section discusses land use for the river segment of the Lower Rio Grande FCP by subcategory (urban development, agricultural use, recreational use, other significant land uses and planned land uses), followed for an additional subsection of the general land use in the vicinity of the Main, North and Arroyo Colorado Floodways.

2.4.1 Urban Development

While agricultural, open space, and park land uses are generally located in more immediate proximity to the project corridor, residential land use in the region is the most significant land use in the urbanized parts of the project vicinity. The densest residential areas of Brownsville and its outlying suburbs are those lying nearest to the Rio Grande (U.S. Census 2000)..

The western end of the proposed floodway improvements begins along the Rio Grande near the community of Peñitas (Population 1,167- 2000 U.S. Census). While the center of this small town is more than one-quarter mile from the project, some residences of this community

are located immediately adjacent to the project area. Traveling east, the area is dominated by agricultural uses, with occasional residences (Google Earth 2006-2007). The Bentsen-Rio Grande Valley State Park is located just east of FM 2062, and occupies 760 acres. Together with over 1,700 acres of adjoining federal refuge land, this park is considered one of the premiere bird watching destinations in the United States.

Continuing east, agricultural land gives way to the urban edge of Mission (Population 45,408- 2000 U.S. Census). While the center of this city is approximately 3 miles from the project, some residential and commercial developed suburbs of this city are located immediately adjacent to the project area. After another stretch of agricultural and wooded area, the project corridor enters another urban area, Hidalgo (Population 7,322-2000 U.S. Census). Industrial and commercial uses are located along the Rio Grande in Hidalgo, and the McAllen-Hidalgo/Reynosa Bridge is a major commercial focus for the area. Further east are some gas fields and then the Santa Ana National Wildlife Refuge, a 2,088-acre refuge (Google Earth 2006-2007).

East of the refuge, the project corridor expands to include the North Floodway, in addition to the Rio Grande. Land uses in the vicinity of the floodways are discussed in the next section.

2.4.2 Agricultural Use

Agricultural lands continue along the project corridor until the small city of Progreso (Population 4,851- 2000 U.S. Census). While the center of this small town is more than .25 miles from the project, some industrial and commercial uses are located immediately adjacent to the project area, as well as the Progreso International Toll Bridge (Google Earth 2006-2007).

The agricultural character of the Rio Grande Valley continues for the remainder of Hidalgo County. In Cameron County, the urbanized areas of Harlingen (Population 57,564 - 2000 U.S. Census) and Brownsville (Population 139,722 - 2000 U.S. Census) contain many suburban residential communities and smaller cities that extend into the immediate project vicinity. These continue along the project corridor into Willacy County as well. In the area immediately adjacent to the Rio Grande, the floodplain appears to be preserved or used for agriculture for the remainder of the corridor. Adjacent to the agricultural area, the majority of the land use is mostly residential. Other land uses, including South Padre Island International Airport, are located in the area as well. Moving closer to the Gulf of Mexico, the Port of Brownsville is adjacent to the Rio Grande (Google Earth 2006-2007).

Agricultural uses dominate the overall project vicinity from the project start point, east to Cameron County, where urbanized land uses take over. Still, agricultural uses are found along the remainder of the corridor along the highways (Google Earth 2006-2007)

2.4.3 Recreational Use

Bentsen-Rio Grande Valley State Park is located just east of FM2062, and occupies 760 acres. Together with over 1,700 acres of adjoining federal refuge land, this park is considered one of the premiere bird watching destinations in the United States. The park features nature trails, a hawk tower, birding blinds and viewing stations, primitive camping sites, and tram

tours. Site features include a visitors' interpretive center, state park store, coffee bar and state-of-the art meeting rooms (TPWD 2007).

The Santa Ana NWR is a 2,088-acre refuge established in 1943 for the protection of migratory birds. This thorn forest habitat is host or home to nearly 400 different types of birds and many other unique species, including the indigo snake, malachite butterfly and the endangered ocelot. The Santa Ana NWR is strategically located where subtropical climate, gulf coast, Great Plains, and Chihuahuan desert meet. Recreational opportunities promoted at the refuge generally focus on bird and butterfly watching. Features include a visitors' center, 12 miles of foot trails and access roads, in addition to a 7-mile tram tour road. These trails vary in length from .one half mile (paved and wheelchair-accessible) to the 7-mile Wildlife Drive (USFWS 2007).

2.4.4 Other Significant Land Uses in the Project Vicinity

The Port of Brownsville features a 17-mile ship channel that meets the Gulf of Mexico at the Brazos Santiago Pass. The City of Brownsville is 2 miles to the southwest. More than 230 companies operate at the Port, and onsite activities include (Port of Brownsville 2007):

- construction of offshore drilling rigs
- ship repairing and dismantling
- steel fabrication, boat construction
- rail car rehabilitation
- LPG storage/distribution
- waste oil recovery
- bulk terminaling for miscellaneous liquids
- grain handling and storage.

Foreign Trade Zone #62 in Cameron County, Texas, includes the Port of Brownsville, as well as the Brownsville-South Padre International Airport, the Harlingen Industrial Park and the Airpark at the Valley International Airport in Harlingen. The zone grantee and operator is the Brownsville Navigation District, a political subdivision of the State of Texas. Foreign Trade Zone #62 is one of the largest trade zones in the U.S. and the largest in Texas (Port of Brownsville 2007).

2.4.5 Planned Land Uses in the Project Area

The most significant planning effort facing the Rio Grande Valley has been the creation of the World Birding Center (WBC). The TPWD, USFWS, and local communities are working together to promote habitat conservation and birding tourism along the state's southern border. The WBC is a network of nine sites along 120 miles of the Rio Grande from South Padre Island west to Roma, with habitats ranging from dry chaparral brush and verdant riverside thickets to freshwater marshes and coastal wetlands. Long range plans include opening over 10,000 acres for viewing. The mission of the WBC is to protect native habitat while increasing the

understanding and appreciation of the birds and wildlife. WBC headquarters are in Mission, and the WBC is centered at the existing Bentsen-Rio Grande Valley State Park (WBC 2007).

In Hidalgo, plans are underway to bring the Old Hidalgo Pumphouse, an existing historical museum, together with the connected series of WBC parks along the Rio Grande. This museum features steam-driven irrigation pumps that transformed Hidalgo County into a year-round farming phenomenon. There are existing trails, and hummingbird gardens are planned at the museum site. Adjacent to the museum property, more than 600 acres of USFWS land is being replanted with native Huisache, Texas Ebony, and Anacua, and will be an important birding tract when opened as part of the WBC (WBC 2007).

2.4.6 Main, North and Arroyo Colorado Floodways

The Main Floodway branch of the project corridor turns away from the Rio Grande and heads north toward the communities of Weslaco (Population 26, 935- 2000 U.S. Census) and Mercedes (Population 17,649- 2000 U.S. Census). Between the Rio Grande and these towns, land uses are mostly agricultural. A golf course is adjacent to the Main Floodway closer to Mercedes, as well as some residential uses. Near these two towns, a branch of the floodway heads north (the North Floodway) and a branch heads east (the Arroyo Colorado Floodway). The North Floodway passes north of SH83, where agricultural uses with interspersed residential development dominate the landscape. Lacy Mercedes Gas Field is east of the North Floodway, approximately seven miles north of US 83. La Villa (Population 1,305- 2000 U.S. Census) is also located in this area, north of FM 107. At this point, the North Floodway makes a sharp turn to the east. It passes Yznaga (Population 103- 2000 U.S. Census) and Sebastian (Population 1,864- 2000 U.S. Census) and continues toward the Gulf Coast through predominately agricultural land (Google Earth 2006-2007).

The Arroyo Colorado Floodway, as stated above, heads east from the Main Floodway near the towns of Weslaco and Mercedes. The Arroyo Colorado Floodway is surrounded mostly by agricultural land uses, but has an increasing number of residences within close proximity as it travels east. Once it reaches the city of Harlingen, the floodway is completely urbanized, with nearby residential uses along most of the corridor. Other land uses including a golf course, parks, commercial, and utilities are interspersed. Residential uses stretch along the Arroyo Colorado Floodway for most of the remainder of the corridor, until park and open space becomes the dominant use at the coast (Google Earth 2006-2007). Suburban communities along the Arroyo Colorado Floodway include Arroyo Colorado Estates (Population 755- 2000 U.S. Census), Villa del Sol (Population 132- 2000 U.S. Census), and Rio Hondo (Population 1,942- 2000 U.S. Census).

2.5 SOCIOECONOMIC RESOURCES

As previously discussed in Subchapter 3.5.1, socioeconomics is defined as the basic attributes and resources associated with the human environment. Depending on local economic and demographic characteristics, the proposed action at the LRGRCP could potentially influence socioeconomic activity within the surrounding region of influence. Impacts on these fundamental socioeconomic components can also influence other issues such as housing availability.

The Lower Rio Grande FCP is located within Cameron, Hidalgo, and Willacy Counties. Some of the larger cities within these counties that are adjacent to the levee system include Cities within these counties that are adjacent to the levee system include Progreso, Relampago, Rio Rico, Santa Maria, Venadito, Cerrecitos, Ranchito, San Pedro, Riverside, Brownsville, and Palm Grove. The Lower Rio Grande FCP also includes the interior floodway system within these counties.

The socioeconomic region of influence for the proposed project includes Cameron, Hidalgo, and Willacy Counties. Socioeconomic characteristics described for the region of influence would not vary between site alternatives for the Lower Rio Grande FCP; therefore, the following discussion is applicable to all of the alternatives.

2.5.1 Regional Economics

For the purposes of this programmatic EIS, regional economics includes population, employment/income, and housing.

Population

Table 5.5-1 presents population characteristics, including populations in 2000, as well as projected populations for 2005, 2020, and 2030 and the percent change for these statistical areas. As shown in Table IV-2.1, the total county population for Cameron County is projected to increase 65 percent from 2000 to 2030 while Hidalgo and Willacy Counties are projected to increase 89 percent and 36 percent, respectively.

Table IV-2.1
Population Growth in Cameron, Hidalgo, and Willacy Counties
Adjacent to the Lower Rio Grande FCP

Jurisdiction	2000	2005	2020	2030	Percent Change 2000-2030
Cameron County	335,227[1]	371,081[1]	476,992[2]	554,513[2]	65%
Hidalgo County	569,463[2]	671,967[2]	879,381[2]	1,078,637[2]	89%
Willacy County	20,082	21,927[2]	25,857[2]	27,284[2]	36%

[1] USCB 2007
[2] TWDB 2006

Employment and Income

The economy of the three county region is based primarily on the service, retail trade, and government sectors. Each of these industries comprised approximately 22 to 23 percent of the total employment in the region of impact. In Cameron County, employment was also high in the manufacturing and transportation industries, approximately 11 percent and 4 percent, respectively. Manufacturing (7 percent), construction (5 percent), and the agricultural (5 percent) industries have relatively high employment in Hidalgo County (USIBWC, 2003b). The estimated total employment for the three counties are shown in Table IV-2.2. The

estimated total employment for the three counties increased 10.8, 26.6, and 5.1 percent, respectively from 2000 to 2005.

Table IV-2.2
Estimated Total Employment for Cameron, Hidalgo, and Willacy Counties Adjacent to the Lower Rio Grande FCP

	2000	2005	Percent Change 2000-2030
Cameron County	118,079[1]	130,864[1]	10.8%
Hidalgo County	191,542[1]	242,525[1]	26.6%
Willacy County	6,552[1]	6,887[1]	5.1%

[1] Texas Workforce Commission 2007

Median household incomes for Cameron, Hidalgo, and Willacy Counties (reported in 1999 dollars) was $26,155, $24,863, and $22,114, respectively. The median family income was $27,853, $26,009, and $25,076 for the respective counties. Per capita income was $10,980 for Cameron County, $9,899 for Hidalgo County, and $9,421 for Willacy County (U.S. Census Bureau 2007).

Approximately 28.2 percent of all families in Cameron County and 29.2 percent in Hidalgo and Willacy Counties were reported to be below the poverty level in the 2000 Census (U.S. Census Bureau 2007).

Housing

According to the 2000 U.S. Census, the housing stock in Cameron County was 119,654, 192,858 in Hidalgo County, and 6,727 in Willacy County. As shown in Table IV-2.3, the number of housing units in Cameron and Hidalgo Counties increased 14.7 percent and 16.7 percent, respectively, from 2000 to 2005. 2005 data for Willacy County was not available.

Table IV-2.3
Estimated Total Housing Units for Cameron, Hidalgo, and Willacy Counties Adjacent to the LRGRCP

	2000	2005	Percent Change 2000-2030
Cameron County	119,654[1]	137,240[1]	14.7%
Hidalgo County	192,858[1]	231,571[1]	16.7%
Willacy County	6,727[1]	Not Available	-

[1] USCB 2007

Agricultural Economics

Approximately 34,277 acres of agricultural land lie in the project area along the Rio Grande in Cameron and Hidalgo Counties. Though land is not cultivated immediately along the riverbanks, agricultural land predominates within the floodplain inside the USIBWC levees (USIBWC, 2003b).

Agricultural industries in the Lower Rio Grande FCP often hire migrant and seasonal workers. A seasonal worker is an individual whose principal employment (51 percent or more) is on a seasonal basis. The definition of a migrant worker is similar; however, a migrant worker establishes a temporary abode for the purpose of employment. Migrant and seasonal farm workers within the region of impact are estimated at 49,719. This is approximately 15 percent of the total labor force within the region of impact (USIBWC, 2003b).

There is an estimated 9,219 migrant and seasonal farm workers in Cameron County, comprising approximately seven percent of the county labor force. Eighty-seven percent (8,012) of these workers are migrants, while seasonal workers comprise of 1,207 or 13 percent. Hidalgo County has an estimated 40,500 migrant and seasonal farm workers. These workers comprise approximately 20 percent of the county labor force. In Hidalgo County, 31,894, or approximately 79 percent of these farm workers are migrant, while 8,606 or 21 percent are seasonal workers (USIBWC, 2003b).

2.5.2 Environmental Justice

Executive Order (E.O.) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, encourages federal facilities to achieve "environmental justice" by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Accompanying E.O. 12898 was a Presidential transmittal memorandum, which referenced existing federal statutes and regulations to be used in conjunction with E.O. 12898. One of the items in this memorandum was the use of the policies and procedures of NEPA, specifically that, "Each Federal agency shall analyze the environmental effects, including human health, economic, and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 USC Section 4321, et seq." In this subchapter, relevant data regarding environmental justice is presented, along with an analysis of census tracts that would be affected by flood control management alternatives being considered by the USIBWC for the Lower Rio Grande FCP in Cameron, Hidalgo, and Willacy Counties, Texas.

Demographic Data

An analysis of demographic data was conducted to derive information on the approximate locations of low-income and minority populations in the community of concern. In developing statistics for the 2000 Census of Population and Housing, the U.S. Department of Commerce, Bureau of the Census, identified small subdivisions used to group statistical census data. In metropolitan areas, these subdivisions are known as census tracts.

Since the analysis considers disproportionate impacts, two areas must be defined to facilitate comparison between the area actually affected and a larger regional area that serves as

a basis for comparison and includes the area actually affected. The larger regional area is defined as the smallest political unit that includes the affected area and is called the community of comparison.

Minority Populations

Executive Order 12898 defines a minority as an individual belonging to one of the following population groups: Hispanic, Black (not of Hispanic origin), American Indian or Alaskan Native, Asian or Pacific Islander. Under Executive Order 12898, minority populations are to be identified if: (i) the minority population with the affected area exceeds 50 percent; or, (ii) if the minority population age is meaningfully greater than the age in the general population. The percentage of the population represented by minorities and the poverty rate for each of the selected census tracts in the project area are shown on Table IV-2.4. The minority population in Cameron, Hidalgo, and Willacy Counties is 85.7, 89.8, and 88.5 percent, respectively. Minority populations of Hispanic nationality dominate in the potential region of influence.

Table IV-2.4 Percentage of Minority Populations and Poverty Rates in the Project Lower Rio Grande FCP Area

	Cameron County	Percent	Hidalgo County	Percent	Willacy County	Percent
White	269,139	80.3	442,525	77.7	14,132	70.4
Hispanic or Latino (of any race)	282,736	84.3	503,100	88.3	17,209	85.7
Black	1,617	0.5	2,807	0.5	439	2.2
Asian	1,607	0.5	3,375	0.6	22	0.1
American Indian	1,471	0.4	2,402	0.4	101	0.5
Poverty (individuals)	109,288	33.1	201,865	35.9	6,300	33.2
Total Minority		85.7		89.8		88.5

Source: U.S. Census Bureau 2007

2.5.3 Transportation

The levee system for the Lower Rio Grande FCP along the Rio Grande extends approximately 180 miles from the town of Peñitas, TX, which is upstream of the Anzalduas Dam, to Brownsville, TX. The levee system transgresses through the southern portions of Hidalgo and Cameron Counties. Cities within these counties that are adjacent to the levee system include Progreso, Relampago, Rio Rico, Santa Maria, Venadito, Crricitos, Ranchito, San Pedro, Riverside, Brownsville, and Palm Grove. The levee system ends on the east side of Brownsville. The Lower Rio Grande FCP also includes the interior floodway system between the levees in Hidalgo, Cameron, and Willacy Counties. This floodway system consists of the Main Floodway that extends from the Banker Weir near Anzalduas Dam, to the divergence of the Arroyo Colorado and North Floodway near the town of Mercedes, or approximately 29 levee miles in length. The North Floodway, which extends approximately 46 levee miles in

length, transgresses through Cameron County to the Laguna Madre northwest of Arroyo City in Willacy County.

Hidalgo, Cameron, and Willacy counties are an important throughway for agricultural products. One of the major arteries for highway traffic is U.S. Highway 281, which connects Hidalgo County with cities to the north. Also important is U.S. Highway 83 which traverses Cameron and Hidalgo Counties from east to west and U.S. Highway 77 in Cameron and Willacy Counties from Brownsville northwest to Harlingen and Raymondville. Hidalgo, Cameron, and Willacy counties have an extensive network of state and farm-to-market roads. The two spans of the Hidalgo-Reynosa International Bridge over the Rio Grande serve as crossing points between Mexico and the United States. A new bridge, the Anzalduas International Bridge, is in the design phase. Two major rail systems serve the two counties. The only railroad legal port of entry in the project area is located in Brownsville, Texas.

There are numerous secondary and connecting routes that run perpendicular to the Rio Grande and cross the highways to the north, which allows access to the border areas along the river. Numerous farm-to-market roads and unpaved county roads cross the project area. In addition, a large system of dirt roads and jeep trails in various conditions occur along the border area.

Legal ports of entry within the project area are located at Brownsville in Cameron County and McAllen in Hidalgo County.

2.6 ENVIRONMENTAL HEALTH

2.6.1 Air Quality

Detailed discussions concerning the Clear Air Act, Title 42, Section 7407 of the U.S. Code, designations of AQCR, NAAQS, and how USEPA classifies the air quality within an AQCR are presented in Subsection 3.7.1, Air Quality.

The levee system for the Lower Rio Grande FCP transgresses through the southern portions of Hidalgo, Cameron, and Willacy Counties, and is located within AQCR 213, or the Brownsville-Laredo AQCR. This AQCR is located completely within the State of Texas, covering Cameron County, Hidalgo County, Jim Hogg County, Starr County, Webb County, Willacy County, and Zapata County. As of April 2005, the USEPA designated air quality within all counties of AQCR 213 to be under attainment status for all criteria pollutants (USEPA 2006). The emissions data for Hidalgo, Cameron, and Willacy Counties are used for analysis purposes because the activity associated with the alternatives would be localized in the narrow area along the river, and emissions from the projected activities would not likely affect the more distant counties within the AQCR.

The TCEQ has identified 16 companies in Hidalgo, Cameron, and Willacy Counties as contributors of point source emissions. Potential stationary point sources of criteria pollutant and hazardous air pollutant emissions within the three counties include the Rio Grande Valley Sugar growers, Wil Ron Manufacturing Corporation, several oil mills and refineries, and utilities and gasoline facilities (TCEQ 2006). The combined area and stationary point source

emission inventory for Hidalgo, Cameron, and Willacy Counties for calendar year 2001, based on the latest available data from USEPA National Emission Inventory as of August 2005 (USEPA 2006), is as follows:

- Carbon monoxide, 243,686 tons per year;
- Volatile organic compounds, 47,135 tons per year;
- Nitrogen dioxide, 33,190 tons per year;
- Sulfur oxides, 2,308 tons per year; and
- Particulate matter greater than 10 micrometers (PM_{10}), 107,102 tons per year.

Existing maintenance activities by USIBWC personnel consists of routine inspections of levees and access roads. Periodic maintenance activities at the levees, channels and floodway results in the use of heavy equipment including scrapers, mowers, bulldozers and dump trucks. Use of these heavy equipment and associated vehicles is typically limited to once every three months or less and does not represent a significant source of air pollutants.

2.6.2 Noise

Land-use and zoning classifications surrounding the project areas provide an indication of potential noise impact. See Subchapter 3.7.1 for a more detailed discussion of noise. Land use in the Lower Rio Grande FCP area is predominantly agricultural with a small percentage through residential areas along the Rio Grande near Hidalgo and Brownsville. The interior floodway system lies adjacent to Mercedes. Due to the flood-prone nature of land within the levees, no sensitive noise receptors are located immediately adjacent to the levees (*i.e.*, within 100 feet). Sensitive receptors would include schools, churches, and medical facilities. Typical existing outdoor noise sources near the levee system include vehicles, pickup trucks, diesel tractor mowers, and other farm machinery. Noise sources such as mowers at 100 feet, and diesel truck or scrapers used to grade levee roads at 50 feet are approximately 70 dBA and 89 dBA, respectively (CERL 1978).

Existing maintenance activities by USIBWC personnel consists of routine inspections of levees and access roads. Periodic maintenance activities at the levees, channels and floodway results in the use of heavy equipment including scrapers, mowers, bulldozers and dump trucks. Use of these heavy equipment and associated vehicles is typically limited to once every 3 months or less and does not represent a significant source of noise.

2.6.3 Public Health and Environmental Hazards

Waste disposal activities at or near the Lower Rio Grande FCP area were reviewed to identify areas where industrial processes occurred, solid and hazardous wastes were stored, disposed, or released; and hazardous materials or petroleum or its derivatives were stored or used. A data search on waste storage and disposal sites was conducted on January 9, 2007 using EnviroMapper for Envirofacts, an internet service provided by USEPA (USEPA 2007a). The facility types that were queried for the Lower Rio Grande FCP area included Superfund sites, toxic release sites, water dischargers, hazardous waste sites, and multi-activity sites. See

Subsection 3.7.1 for a more detailed discussion of public health and environmental hazards and EnviroMapper.

The search extended along the Lower Rio Grande FCP area, including the interior floodway system, up to 1 mile from the levee corridor centerline. No Superfund sites were identified for the Lower Rio Grande FCP area. Within 1 mile of the levee centerline, two toxic release sites, 40 hazardous waste sites, 22 water dischargers, and nine multi-activity sites were identified during the query.

SECTION 3
ENVIRONMENTAL CONSEQUENCES

This section describes potential in the same sequence: water resources; biological resources; cultural resources; land use; socioeconomics resources; and environmental health issues.

3.1 WATER RESOURCES

Impacts to water resources would be considered significant if any of the following were to occur: substantial flooding or erosion; adverse effects on any significant water body (such as stream, lake, or bay); exposure of people to reasonably foreseeable hydrologic hazards such as flooding; or, adverse effects to surface or groundwater quality or quantity. Impacts on water quality would be considered significant when concentrations of indicator parameters exceeded regulatory values for protection of human health and aquatic life.

3.1.1 No Action Alternative

Under the No Action Alternative, the Lower Rio Grande FCP operation and maintenance would not change from the current management practices. The levee system and current levels of protection associated with the flood control system, water supply, and water management would remain unchanged from current operations and maintenance practices. Under sever storm events, current containment capacity may be insufficient to fully control Rio Grande flooding with risks to personal safety and property.

3.1.2 Enhanced Operation and Maintenance Alternative

Improvements to the Lower Rio Grande FCP levee system would increase flood containment capacity to control a 100-year storm event, including the interior floodway system. Vegetation removal and sediment removal from dredging the mouth of the Rio Grande near the Gulf Coast would improve floodway and channel conditions. Shore/aquatic vegetation removal would eradicate aquatic invasive species for the lower reach of the Lower Rio Grande FCP.

The significance and extent of impacts to water resources would be evaluated on a project and site-specific basis. Conformance with federal regulations and coordination with state and local agencies regarding surface water impacts would be required. Notification and permitting procedures for specific proposed actions would be evaluated for each site-specific project prior to construction activities. Best management practices for preventing contamination from storm water runoff during construction activities would be specified in mitigation plans and implemented accordingly. The use of non-potable water during construction would depend upon the climatic conditions and the need to suppress fugitive dust. Water for dust suppression would typically be obtained from nearby surface water bodies or non-potable water wells. Withdrawal permits would be obtained prior to initiation of project activities. No releases of hazardous materials to any ground surface or water drainage would be allowed. Accidental

spills or leaks of hazardous materials would be controlled and contained to avoid potential impacts to water resources.

3.1.3 Integrated Water Resources Management Alternative

This alternative includes the same construction activities as the EOM Alternative. Therefore, the analysis and conclusions associated with water resources from the IWR Alternative would be the same as the EOM Alternative. In addition to these construction activities, the IWR Alternative includes water use and conservation measures such as irrigation BMPs to increase water delivery efficiency. Additionally, water quality monitoring and irrigation structures maintenance would be used to improve water quality.

3.1.4 Multipurpose Project Management Alternative

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives. Therefore, the analysis and conclusions associated with water resources from the MPM Alternative would be the same as the EOM and IWR Alternatives. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives to control invasive/exotic species and wildlife habitat outside the ROW, and increase backwaters at the mouth of arroyos to increase aquatic habitat. Additionally, multiagency initiatives such as flow regime modifications would improve year-round baseflow and watershed management for sediment control. The impacts of the MPM Alternative to water resources would not be considered significant.

3.2 BIOLOGICAL RESOURCES

Biological resources analyses used the following evaluation criteria to assess the impacts of the alternatives:

- Diminished habitat for plant or animal species;
- Diminished population sizes or regionally important plant or animal species; and
- If the project would interfere with or improve movement of animal species.

3.2.1 No Action Alternative

Vegetation

No changes would be made to improve the levees, to change the floodway management or to change the channel maintenance activities, and therefore no changes to the vegetation in the area would occur. The levee slopes would continue to be mowed on an as-needed basis, and vegetation would be removed for USBP operations. The levee slopes would remain primarily invasive grasses that rapidly re-grow after disturbances such as mowing. Native species would not be expected to become established on the levee slopes. The levee slopes would remain primarily invasive grasses that rapidly re-grow after disturbances such as mowing. Vegetation

between river mile 28 and river mile 62.5 would continue to be cleared along the low water edge. The 33-foot wide vegetated wildlife corridor would be maintained.

Wildlife

No changes would be made to improve the levees, to change the floodway management or to change the channel maintenance activities, and therefore no changes to the vegetation in the area would occur. The on-going mowing operations and vegetation removal for USBP operations would maintain the habitat as relatively low quality for use by wildlife, except as a transit corridor. The vegetated wildlife corridor would continue to be available as wildlife habitat and as a transit corridor.

Threatened and Endangered Species

The vegetated wildlife corridor would continue to be available as habitat and as a transit corridor. Vegetation maintenance requirements of the 1993 aand 2003 Biological Opinion would be followed to support threatened and endangered species.

Aquatic Ecosystems

Sediment removal and disposal would continue on an as-needed basis. Within the interior floodway, sediment would be removed from pilot channel and lateral drains as needed. Removal of invasive aquatic species hydrilla and water hyacinth would continue as needed. The removal of sediment and invasive aquative species would temporarily improve habitat for aquatic species.

Unique or Sensitive Areas

According to the USFWS Biological Opinion issued in 1993, vegetation removal was reduced to protect sensitive habitats. Although several tracts of land are present in the project area, because there will be no improvements to the levee, changes in floodway management, or changes in channel maintenance, the sensitive lands would not be affected.

Wetlands

No changes would be made to improve the levees, to change floodway management, or to change channel maintenance. Therefore, existing wetlands adjacent to the levees would not be affected by dredge and fill operations, by expansion of the levee footprint, or other operations that would inhibit wetland function.

3.2.2 Enhanced Operation and Maintenance Alternative

Vegetation

Levee System. Improvements to the levee system that will improve flood control have the potential to affect vegetation. To meet flood control and water delivery obligations, the levee height will be raised in some locations of the LRGFLP. Increases in levee height will concomitantly increase the levee footprint. In the upper 30 miles of the project area, levee height may be increased by at least 4 feet, which will require the removal of more extensive areas of vegetation. Vegetation would be removed on the levee sidewalls where fill would be added and within the expanded levee footprint. The vegetation of the levee sidewalls is

generally composed of invasive grasses that are expected to rapidly reestablish in the area. Within the expanded levee footprint, there are several plant communities including thornscrub and wetlands that would be impacted. In addition to raising the levee, structural improvements may be required in extensive sections of the river. Structural improvements would remove vegetation on the levee sidewalls. Grasses are expected to rapidly re-establish after the structural improvements are completed.

Floodway Maintenance. Within the upper reaches of floodways, some changes are possible in the amount of vegetation removed and the timing and/or extent of mowing. This may result in recovery of native vegetation in limited reaches of the river. Downstream of river mile 62.5, vegetation is managed under an USFWS Biological Opinion, and no changes in management are expected. Due to limited jurisdictional floodway, there are no grazing leases within the project area, and none will be granted.

River Channel. Sediment removal from the river channel would continue on an as needed basis. Additional sediment removal for boundary stabilization and reopening of the mouth of the Rio Grande may be required. Removal of aquatic invasive species would continue on an as-needed basis, however, the downstream reaches of the project are heavily infested, and additional action to eradicate the invasive aquatic species may be required.

Wildlife

Levee improvements that include vegetation removal have the potential to also affect wildlife species. The grasses on the levee slopes provide limited wildlife habitat, but may be used as transit corridors. The vegetation at the toe of the levee that is removed with levee expansion may provide suitable wildlife habitat, particularly if the vegetation is thorn woodland or wetlands, and removal would limit habitat or suitable transit corridors. The removal of thorn woodland or impacts to wetlands would be limited to the extent possible, which in turn will limit the impacts to wildlife species.

Threatened and Endangered Species

The vegetated wildlife corridor would continue to be available as habitat and as a transit corridor. Vegetation maintenance requirements of the 1993 aand 2003 Biological Opinion would be followed to support threatened and endangered species.

Aquatic Ecosystems

Levee improvements would have no affect on fisheries and aquatic habitats under the EOM Alternative.

Unique or Sensitive Areas

Areas under the management of the USFWS biological opinion will not be affected by the EOM alternative. If mowing and vegetation removal practices are changed such that native vegetation may re-establish, this will provide additional habitat that may be used by wildlife and T&E species, although generally only as transit corridors. Any changes to lands managed by the USFWS, TPWD or other agencies will be in cooperation with the appropriate agency.

Wetlands

If wetlands would be impacted by levee improvements, this action would have to be permitted through the Army Corps of Engineers, Section 404 permit.

3.2.3 Integrated Water Resources Management Alternative

Vegetation

The actions for the EOM Alternative will be included in the IWR Alternative, but no additional vegetation management actions are planned.

Wildlife

Wildlife will be affected as for the EOM Alternative, but no additional actions that will affect wildlife are planned under the IWR Alternative.

Threatened and Endangered Species

Threatened and Endangered species habitat will remain intact, as for the EOM Alternative. There are no additional actions under the IWR Alternative that will affect T&E species.

Aquatic Ecosystems

There would be no changes under the IWR Alternative that would affect fisheries and aquatic ecosystems.

Unique or Sensitive Areas

The actions under the EOM Alternative may affect unique or sensitive habitat, but no additional actions under the IWR Alternative will affect these habitats.

Wetlands

If wetlands will be impacted by levee improvements, this action would have to be permitted through the Army Corps of Engineers, Section 404 permit. If wetlands are impacted, then mitigation will occur.

3.2.4 Multipurpose Project Management Alternative

Vegetation

In addition to the actions for the IWR alternative, there are several actions for the MPM alternative that might affect vegetation. In general, the actions described for the MPM alternative include regional initiatives, outside the USIBWC scope, and these actions would require multi-agency cooperation to achieve. The action to improve habitat conservation within the USIBWC ROW would improve suitable habitat for native vegetation, and this initiative would occur in conjunction with TPWD. Similarly, under the MPM Alternative, habitat conservation outside the USIBWC ROW would be a regional initiative that would improve habitat native vegetation species. There is a minimum potential for additional use of the jurdictional floodway since it is confined to narrow corridors along the levee system and stream beds.

Wildlife

Wildlife resources under the MPM alternative rely primarily on cooperative agreements for areas outside USIBWC jurisdiction, and primarily include cooperative agreements to improve habitat within and outside the USIBWC ROW. These improved habitats would, in turn, improve habitat for both resident and migratory wildlife species.

Threatened and Endangered Species

As for other wildlife species, regional initiatives that preserve and restore suitable wildlife habitat will improve foraging and breeding habitat for threatened and endangered species, both resident species and migratory species.

Aquatic Ecosystems

Fisheries and Aquatic Ecosystems under the MPM alternative will also rely on regional initiatives to improve habitat. Regional initiatives to improve aquatic habitat may include such actions as increasing the backwaters at the mouths of arroyos to increase aquatic habitat. This initiative would involve cooperation with natural resource management agencies and the local irrigation districts. This initiative would improve the quantity and quality of breeding, foraging, and nursery habitat for aquatic species. An additional regional initiative would be to modify flow regime to provide year-round baseflow. This initiative would be viable as a regional multi-agency initiative, because the USIBWC has no ownership or direct control of the extent or timing of water releases. This initiative would improve quantity and quality of aquatic habitats.

Unique or Sensitive Areas

Unique and sensitive habitats would be affected as for the EOM and IWR Alternatives. No additional measures under the MPM Alternative would affect unique or sensitive habitats.

Wetlands

Under the MPM Alternative, no actions would be taken to improve wetlands, and wetlands would be affected as under the EOM and IWR Alternatives.

3.3 CULTURAL RESOURCES

Cultural resources in the Lower Rio Grande FCP are defined as historic properties that are archeological sites or historic structures. In several cases, archeological sites also contain historic structures. Archeological sites in the project area range in date from the Formative period (A.D. 200 to 1450 [GeoMarine 2005:3-4]) to the historic period. Historic structures are defined as those that were constructed 50 or more years ago. For both of these cultural resource types, the project area encompasses all areas that could be either directly affected by the project, or areas where a change could result in indirect effects to cultural resources.

The responsibility of the USIBWC toward cultural resources is to address the requirements of the NHPA of 1966, as amended, and the ARPA of 1979. Section 106 of the NHPA requires that historic properties, including archeological sites and historic structures that are eligible for or listed in the NRHP, be taken into consideration during the planning process. The NRHP is

the official list of historic properties within the United States that are historically significant due to their research potential in the areas of history, architecture, or archeology. Impacts to cultural resources are considered during the planning of the Lower Rio Grande FCP because changes to the current system may have the potential to affect the historic integrity of a resource, which could compromise its eligibility for listing in the NRHP. In compliance with Section 106 of the NHPA, consideration of cultural resources includes the identification, evaluation, and protection of the resources.

3.3.1 No Action Alternative

Under the No Action Alternative, the Lower Rio Grande FCP operation and maintenance would not change from the current management practices. No adverse affects are anticipated on historical or archaeological resources.

3.3.2 Enhanced Operation and Maintenance Alternative

Proposed improvements to the Rio Grande Rectification FCP under the EOM Alternative may adversely affect known or potential historic resources by physical changes to the levee configuration or floodway modifications. Similarly, under the EOM Alternative may adversely affect known archeological sites and high probability areas (HPA) that may contain historic or prehistoric archeological materials by mechanical excavation or by burial under the expanded levee footprint.

3.3.3 Integrated Water Resources Management Alternative

Potential improvement measures for the Rio Grande Rectification FCP under the IWR Alternative would be similar to those anticipated for the EOM Alternative. Improvement measures for water use and conservation are not likely to increase the potential to adversely affect historical or archeological resources.

3.3.4 Multipurpose Project Management Alternative

Potential improvement measures for the Rio Grande Rectification FCP under the MPM Alternative would include those anticipated for the EOM Alternative. An increased potential to adversely affect historical or archeological resources could result from actions supported under cooperative agreements.

3.4 LAND USE

This section characterizes land uses in the immediate and general vicinity where project facilities would be located or where those facilities could cause impacts. Impacts to land use would be considered significant if any of the following were to occur: changes in agricultural land use; or changes in recreational use.

3.4.1 No Action Alternative

Under the No Action Alternative, the Lower Rio Grande FCP operation and maintenance would not change from the current management practices. There would be no impact to surrounding land uses.

3.4.2 Enhanced Operation and Maintenance Alternative

Improvements made to the levee system would not impact land usage in the project vicinity.

3.4.3 Integrated Water Resources Management Alternative

The land use impacts of the IWR Alternative would be similar toi those described as part of the EOM Alternative.. .

3.4.4 Multipurpose Project Management Alternative

The land use impacts of the MPM Alternative would include those described as part of the EOM Alternative. Additional elements of the MPM Alternative have the potential for affecting land use. A key emphasis of the MPM Alternative is multi-jurisdictional, regional, cooperative agreements that promote watershed management and habitat conservation initiatives. If new land uses are adopted in the region, they may affect adjacent land uses as well. For any proposed habitat or nature preserve that receives federal funding, additional regulatory clearance processes will require further examination of the impact to local and regional land uses.

3.5 SOCIOECONOMIC RESOURCES

A socioeconomic impact would be considered significant if the federal action resulted in substantial growth or concentration of population or the need for substantial new housing or public services.

3.5.1 No Action Alternative

Regional Economics

Population, Employment/Income, and Housing

Under the No Action Alternative, the Lower Rio Grande FCP operation and maintenance would not change from the current management practices. This alternative would not generate additional business sales, income or employment from construction. Current maintenance practices for the Lower Rio Grande FCP would continue to provide a steady, long-term benefit by continuing to inject revenue in wages and expenditures into the regional economy every year. The Lower Rio Grande FCP currently employees a permanent staff of persons in the USIBWC Mercedes Field Office.

The low-intensity land use in the Lower Rio Grande FCP area and the fact that the majority of the existing channel, floodways, and levees have been constructed on undeveloped and public lands tends to minimize socioeconomic impacts from the continued operation of the Lower Rio Grande FCP.

Environmental Justice

Executive Order 12898 requires that each federal agency analyze the human health, economic, and social effects of federal actions, including the effects on minority communities and low-income communities. An impact to environmental justice would be considered significant if the federal action had disproportionately high and/or adverse human health or environmental effects on minority and low-income populations.

The affected area is the footprint of land where potential adverse impacts could result from a planned activity. For this project, these are the areas that could be affected by flood waters of the Rio Grande.

Environmental justice impacts can arise as a result of the uncontrolled flood waters that may cause damage to property. The No Action Alternative would result in the continued control of flood waters using current maintenance practices in accordance with applicable regulatory requirements and, therefore, would not result in any increased in flood and associated health hazards to the immediate community.

No adverse impacts to biological resources, geologic resources (*e.g.,* soil), air quality, noise, and cultural resources would occur for the No Action Alternative. For these reasons, there is no potential for disproportionately high and adverse human health and environmental effects on minority and low-income populations.

Transportation

Under the No Action Alternative, the Lower Rio Grande FCP operation and maintenance would not change from the current management practices. No additional construction equipment or vehicles would be required if the current operation and maintenance practices were continued. .The existing traffic levels for the roadway system would not be changed by the no action alternative. Current roadway activity includes current management practices for the LGRFCP.

3.5.2 Enhanced Operation and Maintenance Alternative

Regional Economics

The analysis of impacts of EOM activities discussed in Subsection 1.2 for the Lower Rio Grande FCP on socioeconomic resources and environmental justice was based on changes in employment, income, and business volume as indicator criteria, as well as the disproportionate number of minority or low-income populations potentially affected by the proposed levee improvements. Similar levee improvement projects in the Lower Rio Grande Valley are estimated to cost approximately $1,000,000 per mile of construction over a 10-year period, or $100,000 per year. Since these types of projects are similar to the types of projects proposed under the EOM Alternative for the Rectification Project, this unit cost was used for this

analysis. The estimated total cost of all the projects in the LRGV is estimated by USIBWC to cost approximately $125 million over the next 10 years, including environmental documentation, geotechnical investigations, design and construction.

On the basis of an estimated cost of $100,000 per mile of construction per year, cost of the EOM Alternative over an estimated 212-mile reach of the existing levee would be a total of $21,200,000 for all three counties. It is estimated that 45 percent of the construction work would occur in Cameron County, 45 percent in Hidalgo County, and 10 percent in Willacy County. This amount represents a direct annual influx of federal funds of $9,540,000 into Cameron County, $9,540,000 into Hidalgo County, and $2,120,000 into Willacy Counties. This influx would have a positive local economic impact, representing an increase in direct and indirect sales of $32,331,183 for Cameron County, $32,331,183 for Hidalgo County, and $7,184,708 for Willacy County. Job creation in direct and indirect employment is estimated at 295 for Cameron County, 295 for Hidalgo County, and 65 for Willacy County. Tables IV-3.1, IV-3.2 and IV-3.3 illustrate the magnitude of the economic influx relative to reference values for those three counties, respectively.

Table IV-3.1 Economic Impacts of EOM Alternative in Cameron County

Evaluation Criteria	Unit Value for Rio Grande Levees [a]	EOM Alternative	Annual Value for Cameron County	Change Relative to Cameron County
Local Expenditures	$ 1,000,000	$ 9,540,000	Not applicable	
Direct Employment	19	181		
Indirect Employment	12	114		
Total Employment	31	295	130,864 [b]	0.22%
Direct Sales Volume	$ 1,274,065	$ 12,154,580		
Indirect Sales Volume	$ 2,114,948	$ 20,176,603		
Total Sales Volume	$3,389,013	$ 32,331,183	$ 5,063,706,648 [c]	0.64%
Direct Income	$ 554,814	$ 5,292,926		
Indirect Income	$ 452,466	$ 4,316,526		
Total Income	$ 1,007,280	$9,609,452	$4,074,469,380 [d]	0.24%

[a] Unit data for levee construction from the USIBWC Rio Grande Canalization Project (Parsons 2004).
[b] Total of the labor force (16 years and older) employed in 2005 (Texas Workforce Commission 2007).
[c] Estimated Gross sales for Cameron County in 2005 (Texas Comptroller of Public Accounts 2005).
[d] Based on a 2000 per capita income of $10,980 and an Cameron County population of 371,081.

No other water use or conservation measures would be required for the interior floodway system. Floodway maintenance is expected to continue under the existing agreement with the U.S. Border Patrol. Small-scale changes are possible in extent or timing of vegetation and sediment removal which would not have an economic impact. The EOM Alternative would not result in significant impacts to regional economics.

Table IV-3.2 Economic Impacts of EOM Alternative in Hidalgo County

Evaluation Criteria	Unit Value for Rio Grande Levees [a]	EOM Alternative	Annual Value for Hidalgo County	Change Relative to Hidalgo County
Local Expenditures	$ 1,000,000	$ 9,540,000	Not applicable	
Direct Employment	19	181		
Indirect Employment	12	114		
Total Employment	31	295	242,525 [b]	0.12%
Direct Sales Volume	$ 1,274,065	$ 12,154,580		
Indirect Sales Volume	$ 2,114,948	$ 20,176,603		
Total Sales Volume	$ 3,389,013	$ 32,331,183	$ 10,250,604,470 [c]	0.32%
Direct Income	$ 554,814	$ 5,292,926		
Indirect Income	$ 452,466	$ 4,316,526		
Total Income	$ 1,007,280	$9,609,452	$6,651,801,333 [d]	0.15%

[a] Unit data for levee construction from the USIBWC Rio Grande Canalization Project (Parsons 2004).
[b] Total of the labor force (16 years and older) employed in 2000 (U.S. Census Bureau, 2000).
[c] Estimated Gross sales for Hidalgo County in 2005 (Texas Comptroller of Public Accounts 2005).
[d] Based on a 2000 per capita income of $9,899 and an Hidalgo County population of 671,967.

Table IV-3.3 Economic Impacts of EOM Alternative in Willacy County

Evaluation Criteria	Unit Value for Rio Grande Levees [a]	EOM Alternative	Annual Value for Willacy County	Change Relative to Willacy County
Local Expenditures	$ 1,000,000	$ 2,120,000	Not applicable	
Direct Employment	19	40		
Indirect Employment	12	25		
Total Employment	31	65	6,887 [b]	7.2%
Direct Sales Volume	$ 1,274,065	$ 2,701,018		
Indirect Sales Volume	$ 2,114,948	$ 4,483,690		
Total Sales Volume	$ 3,389,013	$ 7,184,708	$ 107,349,748 [c]	6.7%
Direct Income	$ 554,814	$ 1,176,206		
Indirect Income	$ 452,466	$ 959,228		
Total Income	$ 1,007,280	$2,135,434	$206,574,267 [d]	1.03%

[a] Unit data for levee construction from the USIBWC Rio Grande Canalization Project (Parsons 2004).
[b] Total of the labor force (16 years and older) employed in 2000 (U.S. Census Bureau, 2000).
[c] Estimated Gross sales for Willacy County in 2005 (Texas Comptroller of Public Accounts 2005).
[d] Based on a 2000 per capita income of $9,421 and an Willacy County population of 21,927.

Environmental Justice

The EOM Alternative would result in the continuation of floodway maintenance under the existing agreement with the U.S. Border Patrol. Small-scale changes are possible in extent or timing of vegetation and sediment removal in the floodway, and shore/aquatic vegetation removal in the channel, which would not have any effects on the ability to control floodwaters. There would be no adverse impacts to biological resources, geologic resources (e.g., soils), air quality, noise, and cultural resources. For these reasons, disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.

Transportation

Under the EOM Alternative, construction would include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 study conducted by the USACE. More significant improvements would likely occur in the upper 30-mile reach where typical levee heights could be greater than 4 feet. However, levee height increases along the interior floodway system would likely be less than 2 feet. All construction activities would occur within the existing USIBWC ROW. Transportation of construction equipment and the use of personnel vehicles would mainly occur within the levee ROW and along the levee road system within the floodway. New easements would have to be obtained by USIBWC if levee footprints are increased from existing conditions.

Heavy construction equipment (dump trucks, front-end loaders, graders) in the upper reach would likely be driven to the construction site from local areas near McAllen using SHs83 and 281. Access to other construction areas along the interior floodway system also would be supported by SH83 near McAllen as well as from Harlingen. Along lower reaches of the Lower Rio Grande FCP, access to construction areas would be from the city of Brownsville using SH77. During construction, a temporary increase in the use of access roads would take place for placement of equipment in staging areas. Most of the subsequent construction activities, however, would not require public road use as material borrow sites would be located in the vicinity of the construction sites. Following completion of the proposed improvements, the levee road would continue providing service for USIBWC and the USBP activities.

Construction vehicles associated with environmental measures within the floodway (such as erosion protection, vegetation removal, sediment management at the mouth of the Rio Grande) would access levee roadways. An increase in transportation on some of the levee roadways from commercial vehicles would likely occur due to primarily disposal of sediment outside the floodway during river channel maintenance. It is anticipated that there would be no significant effect on traffic flow from project construction. Although an increase in traffic is anticipated, the increase would not be substantial in relation to the existing traffic load and capacity of the roadway system.

This increased construction related traffic would be an inconvenience to commuters traveling on U.S. Highways 83 and 281 during the morning commute (the project construction traffic in the evening would occur before the primary evening commute hour). This impact on traffic and circulation on the affected roadways would be temporary and not considered significant, only lasting during the construction period.

3.5.3 Integrated Water Resources Management Alternative

Levee improvement activities involving construction for this alternative would be similar to the EOM Alternative. Therefore, the analysis and conclusions associated with socioeconomic resources and environmental justice from the IWR Alternative would be the same as the EOM Alternative.

The IWR Alternative would result in possible small-scale changes in the timing and/or extent for irrigation best management practices to increase water delivery efficiency, water

quality monitoring for high chloride and fecal coliforms, and irrigation structure maintenance. These changes to ongoing operations and maintenance at the Rio Grande flood control facilities would not be expected to result in any direct or indirect impacts to population, employment, income or housing.

Transportation

Traffic levels for this alternative involving construction would be similar to the EOM Alternative. This alternative would generate the same effects on traffic. The increase in traffic levels would not be substantial in relation to the existing traffic load and capacity of the roadway system.

3.5.4 Multipurpose Project Management Alternative

Levee improvement activities for this alternative would not vary from the EOM Alternative. Therefore, the analysis and conclusions associated with socioeconomic resources and environmental justice from the MPM Alternative would be the same as the EOM Alternative.

The MPM Alternative would result in possible small-scale changes in the timing and/or extent of control of invasive/exotic species outside the ROW, wildlife habitat conservation outside the ROW, increase backwaters at mouth of arroyos to increase aquatic habitat, and flow regime modification to provide year-round baseflow. Changes to offsite wildlife habitat conservation efforts by other agencies or entities may occur as the result of USIBWC participation in multi-agency conservation initiatives. These changes to ongoing operations and maintenance at the Rio Grande flood control facilities would not be expected to result in any direct or indirect impacts to population, employment, income or housing. Additionally, these changes would not be expected to result in any substantial change other than beneficial effects on wildlife and habitat conservation. Impacts to geologic resources (*e.g.*, soil), air quality, noise, and cultural resources would not be expected as a result of the MPM Alternative. For these reasons, disproportionately high and adverse human health and environmental effects on minority and low-income populations would not be expected.

Transportation

Traffic levels for this alternative would not vary from the EOM and IWR Alternatives. This alternative would generate the same effects on traffic. The increase in traffic levels would not be substantial in relation to the existing traffic load and capacity of the roadway system.

3.6 ENVIRONMENTAL HEALTH

Evaluation criteria considered in air quality analysis include the following.

- Would emissions from the action cause or contribute to a violation of any national, state, or local ambient air quality standard?
- Would emissions from the action represent 10 percent or more of the emissions inventory for the affected AQCR counties, to be considered regionally significant?

The following evaluation criteria were used to determine the impacts of noise:

- The degree to which noise levels generated by demolition and construction activities would be greater than the ambient noise levels;
- The degree to which there would be annoyance, speech interference, and hearing loss; and
- The proximity of noise-sensitive receptors to the noise source.

The evaluation criteria listed below were used to assess the alternatives with regard to hazardous materials and waste.

- Would the action violate federal or state regulations for hazardous waste usage, storage, or disposal?
- Could the action require materials that could not be accommodated by existing guidance?
- Would there be human exposure to hazardous wastes or materials due to the action?

Would the action cause hazardous waste generation that could not be accommodated by current waste management practices?

3.6.1 No Action Alternative

Under the No Action Alternative, the Lower Rio Grande FCP operation and maintenance would not change from the current management practices.

Air Quality

Existing air emissions from current practices are established in the emissions inventory for Cameron, Hidalgo, and Willacy Counties. None of the proposed improvement projects would occur and the current configuration of the levee system would be retained under the No Action Alternative. The No Action Alternative would not contribute to a violation of any national, state, or local ambient air quality standard, and would not raise the emissions within the three counties beyond 10 percent of the counties' current estimated emissions inventory. Air emissions would not be expected to increase beyond the established emissions inventory in the Lower Rio Grande FCP area.

Noise

Under the No Action Alternative, the Lower Rio Grande FCP operation and maintenance would not change from the current management practices.. None of the proposed improvement projects would occur and the current configuration of the levee system would be retained.

As stated under the affected environment, no sensitive noise receptors (*i.e.*, schools, churches, and medical facilities) are located immediately adjacent to the levees (*i.e.*, within 100 feet). Therefore, there would be no significant impacts due to noise from current levee maintenance activities.

Public Health and Environmental Hazards

Hazardous material practices of the USIBWC are in compliance with applicable standards under the current operations and maintenance practices. Storage of diesel fuel and refueling of vehicles and equipment is performed in compliance with applicable state and federal standards. No hazardous materials sites are currently affected by operations and maintenance activities. Therefore, current USIBWC practices would not affect hazardous materials handling, nor any facilities or sites in the project area.

The LRGRCP would continue to implement current maintenance practices such as resurfacing roadways of the levee system and floodway maintenance activities. This alternative would not result in exposure to any contamination on the site, and there are no remediation activities ongoing at the LRGRCP. For these reasons, impacts to public health and environmental hazards would not occur.

3.6.2 Enhanced Operation and Maintenance Alternative

Air Quality

Under the EOM Alternative, construction would be similar to the other project alternatives and include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 USACE study. Improvements that are more significant would likely occur in the upper 30-mile reach where typical levee heights could be greater than 4 feet. However, levee height increases along the main floodway and north floodway, or the interior floodway system, would likely be less than 2 feet. The main floodway is 29 miles and the north floodway is 46 miles, each with a north and south levee. A total of 102 miles of levee have been built on the U.S. portion of the Rio Grande. From the beginning of the Lower Rio Grande FCP at Peñitas to the mouth of the Rio Grande is 177 miles, which includes the interior floodway system. However, only 16 out of 29 miles of the main floodway, 42 out of 46 for the north floodway, and 96 out of 102 miles of the U.S. side of the river would undergo improvements. In addition, the north and south levees of the main and north floodways would be improved, which would double the distance of the interior floodways for analysis purposes. Therefore, 212 miles of levee will be considered in estimating air emissions for the EOM Alternative.

With an average 16-foot crown width of the levee and an average levee height of 15 feet, and a 3:1 ratio for levee height to length of slope, the current surface width of the levee in the Lower Rio Grande FCP area is approximately 106 feet. For the purposes of this analysis, a conservative assumption for increase in the levee height is 4 feet for the EOM Alternative. This increase in height would translate to an approximate increase of levee surface width by 24 feet. Assuming a new levee surface width of 130 feet, the total disturbed area of the EOM Alternative improvements would be estimated at 686,400 square feet per mile.

The levee system for the Lower Rio Grande FCP transgresses through portions of Hidalgo, Cameron, and Willacy Counties, and is located within AQCR 213. The USEPA designated air quality within all counties of AQCR 213 to be under attainment status for all criteria pollutants (USEPA 2006). Impacts to air quality in attainment areas would be considered significant if pollutant emissions associated with the implementation of the EOM Alternative caused or

contributed to the exceedance of any national, state, or local ambient air quality standard; or represented an increase of 10 percent or more in the affected counties emissions inventory.

Air emissions were calculated for the EOM Alternative based on per mile unit annual emissions estimates, listed in Table IV-3.4. Unit air emissions estimates were based on common construction practices and methods (Means 2005) and emission factors reported by USEPA (USEPA 1996). Unit emissions were then multiplied by the length of the EOM Alternative affected areas, to estimate air emissions for the alternative.

Table IV-3.4 Potential Air Emissions of the EOM Alternative

	Emissions (tons per year)				
	Sulfur Oxides	**Nitrogen Dioxides**	**Carbon Monoxide**	**Volatile Organic Compounds**	**Particulate Matter (PM_{10})**
Increase levee height, unit emissions (per mile)	0.24	1.90	12.97	0.65	8.00
EOM Alternative in Hidalgo, Cameron, and Willacy Counties (212 miles)	50.88	402.80	2,749.64	135.68	1,696
Hidalgo, Cameron, and Willacy Counties Emissions Inventory (USEPA 2006)	*2,308*	*33,190*	*243,686*	*47,135*	*107,102*
Emissions as a Percent of County:	2.20%	1.21%	1.13%	0.29%	1.58%

Improvements to the levee through the EOM Alternative would not impact air quality through excavation and fill activities. An increase in localized criteria air pollutants would occur due to emissions associated with increasing the existing levee height. Table IV-3.4 summarizes the estimated criteria pollutant emissions associated with the EOM Alternative, as well as the percent increase above the existing county emissions inventory. Criteria pollutant increases in Hidalgo, Cameron, and Willacy Counties by levee construction under the EOM Alternative would range from 0.29 to 2.20 percent above the No Action Alternative and would not be considered regionally significant.

Noise

Land use in the Lower Rio Grande FCP area is predominantly agricultural with a limited percentage through urban areas in the middle and lower reaches of the project area. Due to the flood-prone nature of land within the levees, no sensitive noise receptors are located immediately adjacent to the levees (*i.e.*, within 100 feet). Sensitive receptors would include schools, churches, and medical facilities. Typical outdoor noise sources associated with the EOM Alternative levee improvements would include pickup trucks, diesel dump trucks, diesel tractor bulldozers, rollers, pavers, and scrapers.

For outdoor activities, a DNL of 55 dBA is the sound level below which there is no reason to suspect potential hearing loss from the impacts of noise. A DNL of 75 dBA indicates there is good probability for frequent speech disruption or annoyance. Therefore, a range of 55 dBA to 75 dBA of noise from the EOM Alternative would be considered an impact due to speech disruption or annoyance, and potential hearing loss. Noise sources associated with the EOM

Alternative construction activities, such as diesel trucks or scrapers, produce an approximate noise level of 89 dBA at 50 feet (CERL 1978). Noise levels at 100 feet would be reduced, but may still be above 55 dBA.

Under the EOM Alternative, construction would include improvements to the levee system described under air quality for this alternative. Noise levels would not greatly increase above the No Action Alternative since current USIBWC operations entail the use of construction equipment to maintain the levee system. This alternative would generate the same effects; therefore, there would be no significant impact from EOM Alternative project construction noise.

Elevated noise levels can interfere with speech, causing annoyance or communication difficulties. As discussed in more detail in Subsection 3.6.2, Chapter II, there is a good probability of speech disruption from construction noise at levels above DNL 75 dBA. Persons conducting conversations within the project area could have their speech disrupted by construction-generated noise. Speech disruption would be temporary, lasting only as long as the noise-producing event. There would be no significant impacts from EOM Alternative noise.

Public Health and Environmental Hazards

Under the EOM Alternative, construction would include improvements to the levee system that would entail increasing the height of the levees with some areas requiring limited structural improvements as identified in the 2004 USACE study. Small localized projects of stream bank stabilization are also possible, but would not contribute significant amounts of air emissions. Analysis and conclusions for hazardous material usage and accidental releases under the Rectification Project EOM Alternative apply.

Improvements to the levee system would not be affected by waste storage and disposal sites. The sites identified by EnviroMapper would not affect, or be affected by the proposed levee construction project due to their distance, and in some cases, the containment systems in place.

3.6.3 Integrated Water Resources Management Alternative

Air Quality

This alternative includes the same construction activities as EOM Alternative; therefore, the analysis and conclusions for the EOM Alternative apply to this alternative. In addition to these construction activities, the IWR Alternative includes water use and conservation measures such as implementation of BMPs to increase water delivery efficiency. Additionally, water quality monitoring would be used as part of the Texas Clean River Program. Water use, conservation measures, and water quality monitoring would not have an impact on air quality.

Noise

Noise levels for this alternative would not vary from the EOM Alternative. This alternative would generate the same effects; therefore, there would be no significant impact from IWR Alternative project construction noise.

Public Health and Environmental Hazards

This alternative includes the same construction activities as EOM Alternative; therefore, the analysis and conclusions for the EOM Alternative apply to this alternative. In addition to these construction activities, the IWR Alternative includes water quality monitoring as part of the Texas Clean River Program, water use, and conservation measures such as salt cedar management along the channel and at arroyo mouths. Hazardous materials usage and waste sites would not affect water use, conservation measures, and water quality monitoring.

3.6.4 Multipurpose Project Management Alternative

Air Quality

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives; therefore, the analysis and conclusions for these alternatives apply. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives. The MPM Alternative would have no additional impacts to air quality.

Noise

Noise levels for this alternative would not vary from the EOM and IWR Alternatives. This alternative would generate the same effects; therefore, there would be no significant impact from MPM Alternative project construction noise.

Public Health and Environmental Health

This alternative includes the same construction activities, water use, and conservation measure activities as the EOM and IWR Alternatives; therefore, the analysis and conclusions for these alternatives apply. In addition, the MPM Alternative includes multipurpose project management plans and participation for jurisdictional floodway use and cooperative agreements and regional initiatives. Hazardous materials usage and waste sites would not affect water use, conservation measures, and water quality monitoring.

3.7 INDIRECT AND CUMULATIVE IMPACTS

Cumulative impacts considered for the Lower Rio Grande FCP are associated with ongoing and future operations of the U.S. Border Patrol, and infrastructure projects as previously described in Section 1.5.

3.7.1 United States Border Patrol Operations

Cumulative impacts for the Lower Rio Grande FCP operation include greater restrictions to public use/access of the floodway due to increased USBP operations and designation of restricted use zones. These actions would not apply to the interior floodway system.

Border-Wide Operations

Potential impacts of potential actions associated with USBP operations along the entire United States-Mexico border were evaluated in a Programmatic EIS (USACE 2001). Those actions would include the full support from JTF-6 to the INS strategy for enforcement activities within a 50-mile corridor along the U.S./Mexico border. The enforcement activities would allow INS to gain and maintain control of the southwest border- area for the purpose of enhancing in the prevention, deterrence and detection of illegal activities. JTF-6's support would fall within three major categories: operational (e.g., conduct of ground patrols Listening Post/Observation Post), engineering (e.g., design and construction of training facilities, buildings, border, roads, fences, and lighting), and general (e.g., data analysis and processing, interpretation of aerial photographs). The actions also include the implementation of INS' Integrated Surveillance Intelligence System (ISIS) which includes installation and monitoring remote sensing system such as ground sensors, low level television cameras, and remote video surveillance systems. The activities proposed by INS and the support provided by JTF-6 allow INS to conduct its investigation, apprehension and patrolling activities more efficiently and effectively; thus reducing the flow of illegal drugs into the United States. This program complies with the Immigration and Nationality Act, Illegal Immigration Reform and Immigrant Responsibility Act, other INS regulations as found in Title 8 of the U.S. Code, National Defense Authorization Act and the President's National Drug Control Strategy.

The cumulative effect of INS/JTF-6 actions since the inception of the program (1989) would be approximately 10,600 acres of vegetation being altered. Most of these effects have occurred or would occur within semi-desert grasslands and/or scrublands. Less than 5-acres of wetlands have been disturbed during this period.

Since 1994, no pertinent cultural resources site or structure has incurred significant impacts due to INS or JTF-6 activities. Over 100 new sites potentially eligible for listing on the NRHP have been identified as a result of INS/JTF-6 projects. Due to the policy of avoidance employed by INS and JTF-6, no long-term or cumulative impacts to cultural resources are expected. In the event avoidance is not possible, testing, excavation and mitigation have been employed and coordinated through the appropriate SHPO and/or Native American Nation.

Impacts to air quality, noise, and water supply and quality would be temporary and minor. Since the projects proposed under the USBP initiatives are similar in type, number and magnitude to those projects that have been completed, no long-term or cumulative adverse impacts to these resources are anticipated.

Soil erosion would occur around construction sites. However, implementation of Stormwater Pollution Prevention Plan and best management practices would alleviate the potential of soil erosion. Further, most of the road improvement projects undertaken by INS and JTR-6 are required due to existing soil erosion that has made roads used for patrol impassable. Consequently, such road improvement projects actually decrease soil erosion problems and the indirect effects to aquatic environs through sedimentation.

Direct economic benefits at the local and regional level would produce insignificant and temporary, direct economic benefits. These benefits would be realized through purchase of construction materials, other project-related expenditures, and temporary labor. Long-term

indirect socioeconomic benefits would result from the reduction of drug trafficking and the social costs associated with such activities.

Operation Rio Grande

Actions proposed for the Lower Rio Grande were specified in the Operation Rio Grande in Starr, Hidalgo and Cameron Counties, Texas. Proposed actions included placement of lighting, fences and boat ramps, road improvements and vegetation mowing at six locations (Rio Grande City, McAllen, Mercedes, Harligen, Brownsville, and Port Isabel). A summary evaluation of environmental effects, and impacts on Threatened and Endangered species, was provided in a Biological Opinion issued by the USFWS on February 3, 2003 (USFWS 2003a).

Regarding two endangered species under consideration, the ocelot and jaguarandi, the Biological Opinion concluded that Operation Rio Grande was not likely to jeopardize those species or their habitat (USFWS 2003b). Placement of new structures would take place largely in urban or disturbed areas, and would require very limited brush removal or additional mowing. No significant cumulative environmental impacts are anticipated relative to those of current operations and improvements to the Lower Rio Grande FCP. In terms of floodway maintenance, brush removal would be minimum and proposed mowing would be limited and compatible with floodway maintenance activities currently conducted by the USIBWC.

3.7.2 Brownsville Weir

The City of Brownsville has proposed construction of a weir across the Rio Grande to meet future municipal and industrial water needs for a service area covering southern and southeastern Cameron County. A gated weir across the river channel would be built at River Mile 48.7, and the resulting in-channel reservoir would extend approximately 42 miles along the Rio Grande. Impounded water would be confined within the existing stream banks.

Potential environmental impacts of the project were summarized in a Biological Opinion issued by the USFWS on May 14, 2003 (USFWS 2003b). Identified impacts include 69 acres of river habitat on the United States side that will be inundated and/or impacted by construction of the weir and associateds structures. Approximately 30 acres of the impacted areas are federal lands (uplands, river channel, and river banks), 24 of which constitute a temporary easement to be revegetated after use. No maintenance activities are anticipated in or along the shore of the reservoir away from the weir structure. Regarding two endangered species under consideration, the ocelot and jaguarandi, the Biological Opinion concluded that the proposed weir construction and reservoir operation, with implementation of specified mitigation actions, was not likely to jeopardize those species or their habitat (USFWS 2003b). Proposed mitigation measures included purchase of 280 acres of brush habitat suitable for inclusion in the cat corridor established by the USFWS; acquisition of 130 acres to use for wetland creation, enhancement or upper buffer areas; and revegetation of 24 acres of habitat temporarily impacted during construction.

Because maintanence will be limited to the vicinity of the weir and mitigation measures wll be adopted, this project would not have a significant cumulative impact relative to proposed improvements to the Lower Rio Grande FCP.

APPENDIX A
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APPENDIX B

Threatened and Endangered Species Lists by County (For Agency Use Only)